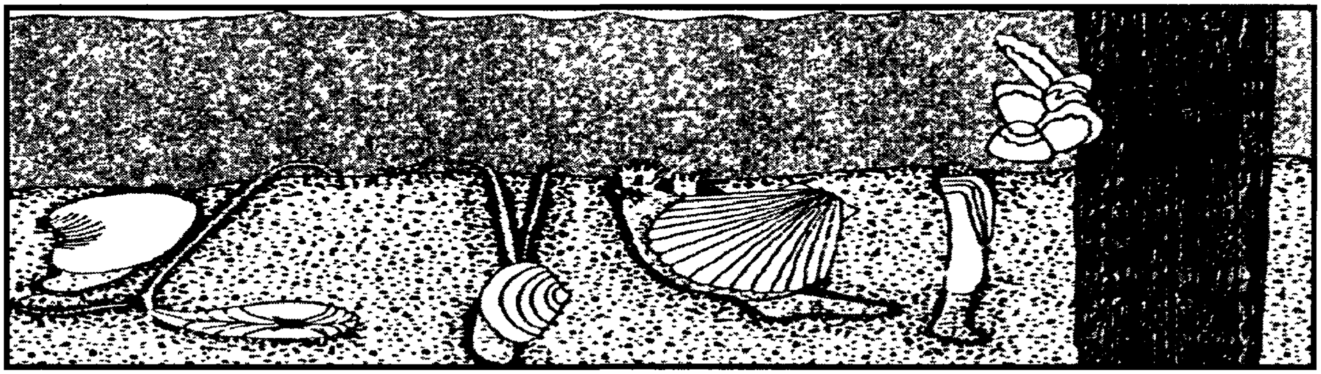
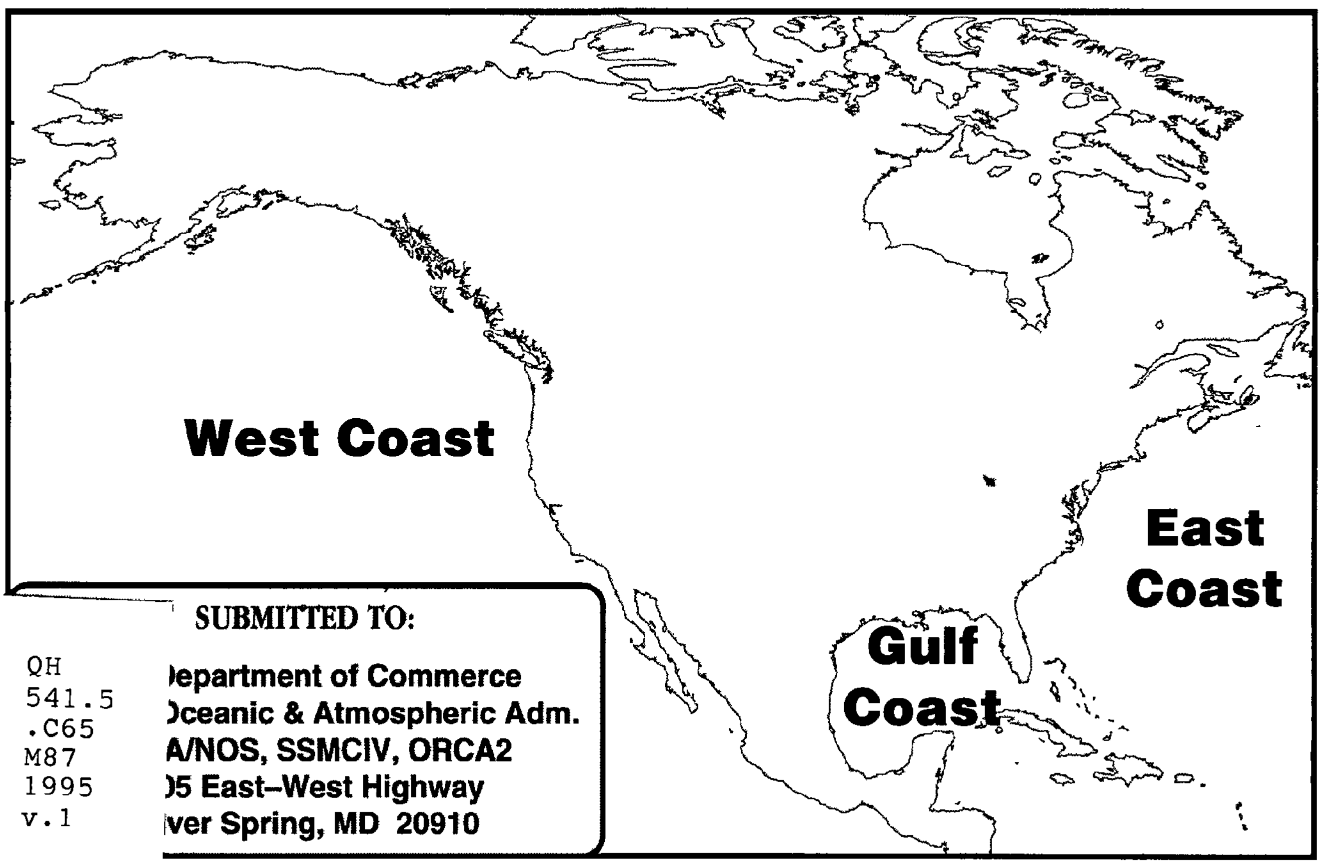
NOAA STATUS AND TRENDS

Mussel Watch Project

Volume 1: Field Sampling and Logistics Report

GERG The Geochemical & Environmental Research Group





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Mussel Watch Program
Volume 1
Field Sampling and Logistics Report

1995

Prepared by

H.J. Jobling, R.R. Fay, and J.M. Brooks

The Geochemical and Environmental Research Group
Texas A&M University
833 Graham Road
College Station, Texas 77845

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U.S. Department of Commerce
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Silver Spring, Maryland 20910

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FIELD SAMPLING AND LOGISTICS

This document provides a detailed description of the sampling sites in the contiguous United States, Alaska, Hawaii and Puerto Rico for the NOAA National Status and Trends (NS&T) Mussel Watch Program for Year X (Period 3, Phase 1). This report contains site descriptions, detailed maps and charts for all the sites that were visited, and successfully sampled during the tenth year (1995) of the program. Locations (Nominal Site Centers) provided are the most recent available for a specific site, and are based on chart data and Global Positioning System (GPS) co-ordinates. GPS positions have been obtained for all of the sampling sites.

Sampling History

In 1986, GERG undertook the first NS&T Mussel Watch site sampling in the Gulf of Mexico. GERG's efficiency in field sampling is attested to by the fact that during the course of the past ten years of the project, the Gulf Coast field collection effort increased from an initial 50 sites in Year 1 to 120 sites by Year X. The field days which were required to complete the sampling decreased from 48 days in Year I to 26 days in Year IV, despite the 40% increase in sampling effort along the Gulf Coast. The subsequent sampling years have all showed similar efficiencies. A total of 32 days were spent in the field, sampling the 51 Year IX sites, of which eleven days were travel days. In Year X (1995), another 33 sites were added to the existing 28 NS&T sites in Texas. These extra sites were sampled in conjunction with a Texas Department of Natural Resources project - *Hydrocarbon Natural Resource Inventory Studies in Texas Bays and Estuaries*. A total of 61 sites were visited along the Texas coastline, and 50 of them were successfully sampled for both sediments and bivalves. Four of the existing 28 NS&T sites in Texas were devoid of any live oysters. The entire Gulf Coast was sampled in 43 days, with 90 sites being visited and 77 of them successfully sampled.

In addition to this increase in the field sampling effort encompassing the Gulf Coast, GERG now samples all three coasts and Alaska. A total of 57 sites were visited on the East Coast over a period of 55 days, 55 of the sites being successfully sampled. All of the West Coast sites were successfully sampled within the allocated project time frame. In the interest sampling experience and local knowledge, GERG teamed up with Applied Marine Sciences to assist in the collection of some of the West Coast sites on the contiguous United States. The Alaskan sites, including nine new sites, were collected by GERG and Kinnetic Laboratories Inc.

The sites from which we have collected oysters in the Gulf of Mexico have not been limited to the coastal embayments, but have included a number of sites which face the open Gulf and can only be reached by long boat transits. Stretching from Port Isabel in the lower Laguna Madre of Texas to Bahia Honda Key in Florida, the study area encompassed over 1500 straight line coastal miles. The actual distance to be traversed is appreciably longer, since access to many remote areas within the embayments is by circuitous route. A single field crew sampling half of the Gulf sites would travel over 8000 miles during a field season. This limited access to the shoreline combined with the very shallow waters of most of the bays (63% of all maintenance dredging in the continental U.S. is done in the Gulf of Mexico) has supported our original contention that the Gulf of Mexico sites are the most difficult U.S. coastal sites to sample.

Bivalve Study Areas

East Coast

The coastal environments which uniquely typify the West and Gulf Coast sites are both found on the East Coast where the oyster and mussel sites are located. Fortunately the extremes in sampling environments, which are the norm for the West and Gulf Coast sites, are rare or totally absent on the East Coast. The very high energy environments combined with a significant to extreme tidal range which dominate West Coast sampling strategies, are very limited in geography and are of a lesser degree on the East Coast. Likewise, sites which are tens of miles from the nearest launch site and requiring navigation through difficult and exposed passages are not characteristic of the East Coast sites. Sites are typically nearshore, close to boat launching facilities, and for the most part are in protected waters. Many of the East Coast bivalve sites are accessible from the shore, but are not difficult to reach as are the sites off the California headlands.

Two species of target bivalves are collected on the East Coast. *Mytilus edulis* are ubiquitous to the northeast and are collected from Maine down to

Delaware Bay. *Crassostrea virginica* is found in the warmer waters to the south and is collected from the Delaware Bay south to Biscayne Bay. Both species are present within the different environments in the Delaware Bay area. Thus slightly different sampling techniques are required along the course of the East Coast sampling. The presence of oysters on approximately half of the East Coast sites does afford the opportunity to offer the more sophisticated field processing of bivalves as we have done on the Gulf of Mexico sites.

Gulf of Mexico

Distributional patterns of molluscan assemblages are dependent on water depth, substrate type, turbidity, salinity, and wave energy. Parker (1960) defined molluscan assemblages along the Gulf coast based on salinity and substrate type. The important inshore, estuarine, and lagunal assemblages are as follows:

I. River Influenced, Low-Salinity Assemblage - The largest and most abundant bivalves in this assemblage are:
   - *Rangia cuneata* - Common in beds all along the Gulf coast, large;
   - *Rangia flexuosa* - Less abundant than *R. cuneata*;
   - *Polymesoda carolinensis* - Missing from Mobile, Alabama, east and Matagorda Bay, west and south and
   - *Macoma mitchelli* - common in most low salinity lagoons and estuaries; small.

This assemblage is characteristic of soft-bottom areas surrounding river mouths, where the salinity is usually less than 10ppt. Typically, the numerically dominant mollusk in this zone is *Rangia cuneata*. *Rangia cuneata, flexuosa*, and *Polymesado carolinensis* have life spans of several years whereas *Macoma mitchelli* is an annual species. Of the longer-lived species, *Rangia cuneata* is also the biomass dominant in this assemblage.

II. Delta - Front Distributary and Interdisciplinary Assemblage - The largest and most dominant bivalves in these assemblages are:
   - *Rangia cuneata* - not as abundant as in river influence assemblage;
   - *Rangia flexuosa* - more abundant in interdistributary bays;
   - *Macoma mitchelli* - rare;

Crassostrea virginica - very abundant in higher salinity interdistributary bays; and

Petricolar pholadiformis - common, but small.

III. Low Salinity Oyster Assemblage - The largest and most dominant bivalves in this assemblage are:

Crassostrea virginica - predominates in this zone; and

Brachidontes recurvus - at times very abundant.

Oyster reefs are abundant where salinities range from 10-30ppt. Most oyster reefs are found in relatively shallow waters. Typically, large reefal structures are formed at right angles to the dominant current flow. These reefs are easily located and are a major geologic feature in most of the bays along the Gulf Coast that were included in this study. *Crassostrea virginica* is the biomass dominant as well as the most numerically-abundant large bivalve in the assemblage. The mytilid *Brachidontes recurvus* is usually found associated with oyster reefs. However, it is not as abundant nor as large, and it has no previous baseline established in the Mussel Watch programs. Furthermore, it rarely occurs in other assemblages where *C. virginica* is an important component.

IV. High Salinity Oyster Assemblage - The largest and most abundant bivalves in this assemblage are:

Anomia simplex - common, but small;

Brachidontes exustus - common, attached to oyster valves; small;

Diplothyra smithii - rare; and

Ostrea equestris - abundant, long lived species.

High salinity reefs form near inlets where relatively high salinity water (34-36ppt) is constantly renewed by tides. The substrate is old shell. *Ostrea equestris* is generally abundant and replaces *C. virginica* when salinities rise above 30ppt. Over the long-term, drought cycles frequently result in the replacement of *C. virginica* with *O. equestris* (and vice versa in wet years) along most of the Gulf coast (Parker, 1960). Thus, this assemblage is effectively identical to the Low Salinity Oyster Assemblage except where salinity causes the replacement of species with other closely related species. In this assemblage, *O. equestris* typically is the biomass dominant.

V. <u>Hypersaline Lagoon Assemblage</u> - The largest and most abundant bivalves in this assemblage are:

Mulinia lateralis - abundant but small;

Tellina tampaensis - moderately abundant; and

Anomalocardia auberiana - very abundant.

Hypersaline lagoons and estuaries are common along the lower Texas coast and have salinities ranging from 40-80ppt. The species in this assemblage are very abundant but are short-lived and small. The numerical dominant in this zone is *Anomalocardia auberiana.*

In the previous EPA Mussel Watch Program, genera from the family Mytilidae (the mussels) were used as the organisms of choice for portions of the geographic range of the mussel watch program. Along the Gulf coast, however, mussels that do occur (i.e., the genera *Brachidontes, Lioberus, Lithophaga, Modiolus, Geukensia,* and others) are often too small and frequently not abundant or widespread enough to be considered as target organisms. Previous baseline organisms along the Gulf Coast for the EPA Mussel Watch Program were all species in the family Ostreidae (viz. *Crassostrea virginica* and *Ostrea equestris*). These two species are frequently biomass dominants, abundant and easily resampled from their respective habitats.

The American oyster, *C. virginica*, occurs in intertidal and sub-tidal habitats all along the Gulf coast (Scott and Lawrence, 1982). *C. virginica* is sufficiently widespread so that it has been able to be collected at the majority of the designated sites. *C. virginica* typically inhabits coastal and lagunal environments with salinity levels normally varying between 20-30ppt although populations at both lower and high salinities are known. Moreover, as shown above, it is one single species common to nearly all the Gulf Coast and is usually biomass dominant where it occurs. The oyster reefs produced by *C. virginica*, which make up the bulk of the sites selected for this portion of the NOAA Mussel Watch Program, are permanent and for the most part large features which are easily located for sampling and resampling. In addition, living oysters usually are abundant on these features and are recruited yearly to the reefs; thus, these areas will be able to sustain repeated sampling over a ten year plus period with minimum impact on the population structure of the reef. Clearly, due to the previous baseline established for this species, its abundance, large size, and ubiquitous occurrence along the Gulf coast, *C. virginica* is the target organism of choice.

Although *C. virginica* has a particularly wide salinity tolerance, a few areas that have been designated as sites are outside its range. In areas of low salinity which do not support *C. virginica*, *Rangia cuneata* is the dominant bivalve. *R. cuneata* is relatively large and abundant. It is the characteristic organism of the low salinity assemblage and it occurs in most low salinity habitats along the Gulf Coast. *R. cuneata* is usually found in abundance at the sediment-water interface on soft bottoms.

We have attempted to find *C. virginica* in the high salinity bays in the lower Laguna Madre between Corpus Christi and Port Isabel with limited success. *O. equestris,* an ecological equivalent, usually replaces *C. virginica* in these areas. *O. equestris* is usually associated with hard bottoms or mangrove roots and is abundant and large. It has an established baseline for comparison because it previously was used in the EPA Mussel Watch program. In addition, it belongs to the same mollusk family (Oestreidae) as *C. virginica.* In most habitats which usually do not support *C. virginica, O. equestris* can be collected and is the organism of choice.

In hypersaline lagoons (i.e., Baffin Bay, Texas) where *C. virginica* and *O. equestris* are absent, *Anomalocarida auberiana* could be sampled. This species is small, yet it is very abundant, reaching population levels of ~2000 per m^2 in some instances.

Because of the concerns about species effects, none of the alternate species at the sites which do not support *C. virginica* have been collected to date.

West Coast

Of the three coasts being sampled in NOAA's Status and Trends Program (i.e., the Atlantic, the Gulf of Mexico, and the Pacific), the greatest extremes in topographies and habitat types are encountered along the Pacific Coast. For the sake of distinguishing between different types of habitats along the West Coast, the following broad categories are identified in Ricketts *et al.* (1968): (I) Open Coast, (II) Protected Outer Coast, and (III) Protected Bays and Estuaries. Although it is recognized that intergradations between these shoreline types have been encountered, this classification scheme can be used to provide a general overview of shore types that will be encountered in Period 3 of the National Status and Trends Mussel Watch Program. Brief descriptions and representative examples for each of the coastline types are presented below.

I. "<u>Open Coast</u>" - These areas are comprised of shorelines that are entirely unprotected and subject to direct impact by wind and wave action. Such a shore is generally convex in shape, varying from distinct headlands to relatively modest bulges in the coastline. Fairly deep water is also usually present close offshore. Examples of areas that can be classified with these criteria along the central California Coast include Pismo Beach, the Point Sur and Point Lobos outer rocks, and the outer reefs of Cypress Point and Point Pinos. Most of the coast of northern California and Oregon can also be included in this category.

II. "<u>Protected Outer Coast</u>" - This classification would also include stretches of open coast, but in locations where the direct impact of the surf is somewhat reduced (e.g., semi-sheltered coastlines and open bays). Protection for such areas may come from a variety of natural barriers such as headlands or close-lying islands, offshore reefs of submerged rock, long and gradually-sloping stretches of nearshore rock and/or sand, offshore kelp beds, or simple refraction of waves around headlands or rocks. Examples of this type of coastline along California can be found in Santa Barbara, much of Monterey Bay, Half Moon Bay, Bodega Bay, and Point Arena.

III. "<u>Protected Bays and Estuaries</u>" - These areas are comprised of enclosed bays, sounds or estuaries that experience the least wave shock of the three types of coastal topographies identified. In the relative absence of wave shock, exposure of substrates in these areas will be primarily a function of the rise and fall of tides. Coastlines in this category will generally have a distinctly concave shape, and will include protected areas with relatively small and often indirect openings to the outer coast. Examples of this type of shoreline include San Diego, Newport, Morro, San Francisco, Tomales, and Coos Bays, areas in Puget Sound, and all of the inside waters in southeastern Alaska.

Field Logistics (East, Gulf & West)

The collection of the bivalve and sediment samples on the East and Gulf Coasts was conducted by GERG, utilizing small boats and two field crews. A field collection crew consisted of two people, in a van or a pick-up, using a trailered outboard boat whenever necessary. AMS personnel worked in a similar way along the West Coast. Table 1 summarizes the site accessibility and collection methods. Samples were collected, packed on blue ice, and shipped back to our labs in College Station by Federal Express for processing the next day. The histopathological samples were sent directly to the Haskins Shellfish Research Laboratory in New Jersey. This ensures that the samples were processed in less then 24 hours after they had been collected. Samples from Alaska were shipped in a similar fashion as perishable items, and were received at the analytical laboratories in less than 48 hours.

Logistic Considerations

There are a number of important factors that have to be taken into consideration when planning the field logistics of the project. Of primary importance, is that each of the sites has an optimum sampling date, eg. PBPI - 3/29, with an acceptable three week window on either side of this date (3/8 - 4/19). The field collection trips are then organized around these operating windows on each of the three coasts. On the East Coast, the optimum sampling dates span a period from 11/27 through to 3/31 - a total of 125 days. The span on the Gulf Coast is from 12/4 through to 2/14 - a total of 72 days and the West Coast sampling date span is from 11/29 through to 3/27 - a total of 121 days.

The three coast are also very different from one another from a logistical point of view. An example of this is easily illoustrated when one looks at one aspect of the logistics - access to the site. When collecting only bivalves at all of the sites (Year X - 1994/95 field season), the East Coast sites are split 50/50 between those that are vehicle/walk-up sites and those that are only accessible by boat. The Gulf Coast is split 10/90 and the West Coast is 70/30. When one looks at this with an even more critical eye, one notes that seven of the eleven sites in Alaska involve either a boat or seaplane ride of over more than 30 miles of open water to get to the remote site.

Table 1. Site Accessibility and Collection Methods.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		Maine		
1	PBPI	Pickering Island Penobscot Bay	B.L.O	H
2	PBSI	Sears Island Penobscot Bay	A	H
3	MSSP	Stover Point Merriconeag Sound	A	H
4	CAKP	Kennebunkport Cape Arundel	A	H
		Massachusetts		
5	CAGH	Gap Head Cape Ann	A	H
6	SHFP	Folger Point Salem Harbor	A	H
7	MBNB	Nahant Bay Salem Harbor	A	H
8	BHDI	Deer Island Boston Harbor	A	H
9	BHDB	Dorchester Bay Boston Harbor	A	H
10	BHHB	Hingham Bay Boston Harbor	A	H
11	BHBI	Brewster Island Boston Harbor	B.S.O	H
12	MBNR	North River Massachusett Bay	A	H
13	DBCI	Clarks Island Duxbury Bay	B.S	D
14	CCNH	Nauset Harbor Cape Cod	A	H
		Rhode Island		
21	NBDI	Dyer Island Narragansett Bay	B.S.O	H
22	NBPI	Patience Island Narragansett Bay	B.S.O	H
23	NBDU	Dutch Island Narragansett Bay	A	H
24	BIBI	Block Island Block Island	A	H
		New York		
38	HRJB	Jamaica Bay Hud./Rar. Estuary	A	H
39	HRUB	Upper Bay Hud./Rar. Estuary	A	H
40	HRLB	Lower Bay Hud./Rar. Estuary	A	H
		New Jersey		
41	HRRB	Raritan Bay Hud./Rar. Estuary	A	H
42	NYSH	Sandy Hook New York. Bight	B.S.O	D
43	NYLB	Long Branch New York. Bight	A	H
44	NYSR	Shark River New York. Bight	A	H
47	DBCM	Cape May Delaware Bay	A	H
49	DBBD	Ben Davis Point Delaware Bay	B.S.O	D

Table 1. Continued.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		Maryland		
54	DBCH	Cape Henlopen Delaware Bay	A	H
55	CBBO	Bodkin Point Chesapeake Bay	B.S.O	D
56	CBMP	Mountain Point Chesapeake Bay	B.S.O	D
57	CBHP	Hackett Point Chesapeake Bay	B.S.O	D
58	CBCP	Choptank River Chesapeake Bay	B.S.O	D
59	CBHG	Hog Point Chesapeake Bay	B.S.O	D
61	PRSP	Swan Point Potomac River	B.S.O	D
		Virginia		
60	PRRP	Ragged Point Potomac River	B.S.O	D
62	PRMC	Mattox Creek Potomac River	B.S.O	D
64	RRRR	Ross Rock Rappahannock	B.S.O	D
65	CBCI	Chincoteague Inlet C. Bay	A	H
66	QIUB	Upshur Bay Quinby Inlet	B.S	H
67	CBCC	Cape Charles Chesapeake Bay	A	H
68	CBDP	Dandy Point Chesapeake Bay	B.S	H
69	CBJR	James River Chesapeake Bay	B.S	D
70	RSJC	John Creek Roanoke Sound	B.S	D
		North Carolina		
71	PSCH	Cape Hatteras Pamlico Sound	A	H
72	PSWB	Wysoching Bay Pamlico Sound	B.S	D
73	PSPR	Pungo River Pamlico Sound	B.S.O	D
74	PSNR	Neuse River Pamlico Sound	B.S	D
76	CFBI	Battery Island Cape Fear	B.S	H
		South Carolina		
78	SRNB	North Bay Santee River	B.S	D
		Georgia		
81	SRTI	Tybee Island Savannah River	B.S	H
82	SSSI	Sapelo Island Sapelo Sound	B.S	H
83	ARWI	Wolfe Island Altamaha River	B.S	H
		Florida (East Coast)		
84	SJCB	Chicopit Bay St. Johns River	A	H
85	MRCB	Cresent Beach Matanzas River	A	H
86	IRSR	Sebastian River Indian River	A	H
87	NMML	Maule Lake North Miami	A	H
88	BBGC	Gould's Canal Biscayne Bay	B.S	H

Table 1. Continued.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		Florida (West Coast)		
205	FBJB	Joe Bay Florida Bay	B.L.O	H
206	FBFO	Flamingo Florida Bay	B.S	H
207	EVFU	Faka Union Bay, Everglades	B.L	H
209	NBNB	Naples Bay Naples Bay	B.S	H
210	CBBI	Bird Island Charlotte Harbor	B.S	H
211	CBFM	Fort Meyers Charlotte Harbor	A/B.S	H
219	CKBP	Black Point Cedar Key	A	H
221	AESP	Spring Creek Apalachee Bay	B.S	H
222	APCP	Cat Point Bar Apalachicola Bay	A	H
223	APDB	Dry Bar Apalachicola Bay	B.S	H
224	SAWB	Waton Bayou St. Andrew Bay	B.S	H
225	PCMP	Municipal Pier Panama City	B.S	H
226	PCLO	Little Oyster Bay Panama City	B.S	H
227	CBSR	Off Santa Rosa Choctawatchee Bay	B.S	T
		Mississippi		
239	MSBB	Biloxi Bay Mississippi Sound	A	H
		Louisiana		
241	LPNO	New Orleans Lake Pontchartrain	B.S	D
242	LBGO	Gulf Outlet Lake Borgne	B.S	D
243	LBMP	Malheureux Point Lake Borgne	B.S	H
244	BSBG	Bay Garderne Breton Sound	B.S	H
247	MRTP	Tiger Pass Mississippi River	B.S	H
248	BBMB	Middle Bank Barataria Bay	B.S	H
249	BBSD	Bayou St. Denis Barataria Bay	B.S	D
250	BBTB	Turtle Bay Barataria Bay	B.S	H/D
253	CLCL	Caillou Lake Caillou Lake	B.S	D
254	ABOB	Oyster Bayou Atchafalaya Bay	B.L	H
255	VBSP	Southwest Pass Vermillion Bay	B.L.O	D
256	JHJH	Joseph Harbor Bayou J. Harbor	B.S	H
258	CLSJ	St. Johns Island Calcasieu Lake	B.S	D
259	SLBB	Blue Buck Point Sabine Lake	B.S	D
		Texas		
260	GBFR	Frenchy's Reef Galveston Bay	B.L.O	D
261	GBHR	Hanna's Reef Galveston Bay	B.L.O	D
262	TBVT	Vingt-et-un Reef Trinity Bay	B.L.O	D

Table 1. Continued.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		Texas (Cont.)		
263	TBTR	Trinity Reef Trinity Bay	B.L.O	D
264	TBDR	Dow Reef Trinity Bay	B.S.O	D
265	GBSC	Ship Channel Galveston Bay	B.S	D
266	GBYC	Yacht Club Galveston Bay	B.S	D
267	GBRB	Red Bluff Reef Galveston Bay	B.S	D
268	GBST	Marker "63" Reef Galveston Bay	B.S.O	D
269	GBRF	Red Fish Bar Galveston Bay	B.S.O	D
270	GBTD	Todd's Dump Galveston Bay	B.S	D
271	GBDK	Dickinson Reef Galveston Bay	B.S	D
272	GBDL	Dollar Reef Galveston Bay	B.S	D
273	GBOB	Offatts Bayou Galveston Bay	A	H
274	GBCR	Confederate Reef Galveston Bay	B.S	H
275	WBCL	Carancahua Lake West Bay	B.S	H
276	WBCB	Chocolate Bay West Bay	B.S.O	H
277	CBBS	Bastrop Bay Christmas Bay	B.S	H/D
278	CBAR	Arcadia Reef Christmas Bay	B.S.O	H/D
279	CBDB	Drum Bay Christmas Bay	B.S	H
280	BRFS	Freeport Surfside Brazos River	A/B.S	H
281	BRCL	Cedar Lakes Brazos River	B.S	H
282	CLCB	Cedar Lakes Bayou Cedar Lakes	B.S	H
283	EMBI	Bird Island East Matagorda	B.S	H
284	MBEM	East Matagorda Matagorda Bay	B.S	H
285	EMMR	3 Mile Reef East Matagorda	B.S	D
286	MBDI	Dog Island Matagorga Bay	B.S	H
287	MBMI	Mad Island Reef Matagorda Bay	B.S	H
288	MBOL	Oyster Lake Matagorda Bay	B.S	H
289	MBTP	Tres Palacios Bay Matagorda Bay	B.S	H
290	MBCB	Carancahua Bay Matagorda Bay	A	H
291	LBKB	Keller Bay Lavaca Bay	B.S.O	H
292	MBLR	Lavaca R. Mouth Matagorda Bay	A	H
293	MBGP	Gallinipper Point Matagorda Bay	B.S.O	D
294	MBPL	Powderhorn Lake Matagorda Bay	B.S.O	H
295	ESBD	Bill Day's Reef Espiritu Santo	B.S	H
296	ESJR	Josephine Reef Espiritu Santo	B.S	D
297	ESSP	South Pass Reef Espiritu Santo	B.S.O	H
298	SAMP	Mosquito Point San Antonio Bay	B.S.O	H
299	SAPP	Panther Pt. Reef San Antonio Bay	B.L.O	D
300	SACF	Chicken Foot San Antonio Bay	B.S.O	H
301	MBAR	Ayres Reef Mesquite Bay	B.L.O	H
302	ABLR	Long Reef Aransas Bay	B.S.O	H/D
303	ABCB	St. Charles Bay Pass Aransas Bay	B.S.O	H

Table 1. Continued.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		Texas (Cont.)		
304	CBLP	Lap Reef Copano Bay	B.S.O	D
305	CBCR	Copano Reef Copano Bay	B.S.O	H
306	ABHI	Harbor Island Aransas Bay	A	H
307	CCEF	East Flats Reef Corpus Christi Bay	B.S	D
308	CCRB	Redfish Bay Corpus Christi Bay	B.S	H
309	CCSP	Shamrock Pt. Corpus Christi Bay	B.S.O	D
310	CCIC	Ingleside Cove Corpus Christi Bay	B.S	H
311	CCNB	Nueces Bay Corpus Christi Bay	B.S	H
312	CCBH	Boat Harbor Corpus Christi Bay	A	H
313	NBOR	Oyster Reefs Nueces Bay	B.S.O	D
314	CCTB	Tule Basin Corpus Christi	B.S	H
315	LMTS	Marker "27" Laguna Madre	B.L.O	H
316	LMAC	Arroyo Colorado Laguna Madre	B.S.O	H
317	LMFN	Marker "49" Laguna Madre	B.S.O	H
318	LMSF	Marker "75" Laguna Madre	B.S.O	H
319	LMPI	Port Isabel Lower Laguna Madre	A	H
320	LMSB	South Bay Lower Laguna Madre	B.S	H
		California		
401	IBNJ	North Jetty Imperial Beach	A	H
402	SDCB	Coronado Bridge San Diego Bay	B.S	H
403	PLLH	Lighthouse Point Loma	A	H
404	SDHI	Harbor Island San Diego Bay	A	H
405	MBVB	Venture Bridge Mission Bay	B.S	H
406	LJLJ	Point La Jolla La Jolla	A	H
407	OSBJ	Municipal Beach Jetty Oceanside	A	H
410	ABWJ	West Jetty Anaheim Bay	A	H
413	PVRP	Royal Palms St. Park Palos Verdes	A	H
415	MDSJ	South Jetty Marina Del Ray	A	H
417	PDPD	Point Dume Point Dume	A	H
422	SLSL	Pt. San Luis San Luis Obispo Bay	A	H
424	PGLP	Lovers Point Pacific Grove	A	H
425	MBML	Moss Landing Monterey Bay	A	H
426	MBES	Elkhorn Slough Monterey Bay	B.S	H
427	MBSC	Point Santa Cruz Monterey Bay	A	H
428	SFDB	Dumbarton Bridge San Francisco	B.S	H
429	SFSM	San Mateo Bridge San Francisco	B.S	H
431	SFEM	Emeryville San Francisco	A	H
433	TBSR	Spenger's Residence Tomales Bay	A	H
435	BBBE	Bodega Bay Entrance Bodega Bay	A	H
436	PALH	Lighthouse Point Point Arena	A	H
437	PDSC	Shelter Cove Point Delgado	A	H

Table 1. Continued.

GERG #	SITE CODE	SITE NAME AND LOCATION	SITE ACCESS	COLLECTION METHOD
		California (Cont.)		
438	HMBJ	Humboldt Bay Jetty Eureka	A	H
439	EUSB	Samoa Bridge Eureka	B.S	H
441	SGSG	Point St. George Cresent City	A	H
		Oregon		
443	CBRP	Russell Point Coos Bay	A/B.S	H
444	YBOP	Oneatta Point Yaquina Bay	A	H
446	YHFC	Fogarty Creek Yaquina Bay	A	H
447	TBHP	Hobsonville Point Tillamook Bay	A	H
449	CRSJ	South Jetty Columbia River	A	H
		Washington		
452	GHWJ	Westport Jetty Gray's Harbor	A	H
457	PSHC	Hood Canal Puget Sound	A	H
458	SSBI	Budd Inlet South Puget Sound	A	H
465	WIPP	Possession Point Whidbey Island	A	H
467	BBSM	Squalicum Mar. Bellingham Bay	A	H
		Alaska		
469	KTMP	Mountain Point Ketchikan	A	H
470	NBES	East Side Nahku Bay	A	H
471	PWSH	Sheep Bay Prince William Sound	B.L.O	H
472	PWKH	Knowles Head PWS	B.L.O	H
473	PVMC	Mineral Creek Flats Port Valdez	B.S	H
474	UISB	Siwash Bay Unakwik Inlet	B.L.O	H
475	PWDI	Disk Island PWS AK	B.L.O	H
476	GASL	Sleepy Bay Gulf of Alaska	B.L.O	H
477	GAWB	Windy Bay Gulf of Alaska	B.L.O	H
478	CIHS	Homer Spit Cook Inlet	A	H
479	GASH	Shuyak Harbor Gulf of Alaska	B.L.O	H

A = accessible by automobile/wading from the shore; B = boat required;
L = time to reach site >1 hour; S = time to reac site <1 hour;
O = site located in a large body of open water or required to cross;
H = hand sampling; T = tong sampling; D = dredge sampling.

Factors to be considered in planning the schedule and logistics for field sampling include the following: tidal periods and ranges, coastal surf conditions, weather, boat launch facilities, availability of dry ice, access to private property, need for daylight access, transportation to remote island sites, notification of Fish and Game, etc. Brief discussions for each of these items follow

- Tidal Periods and Ranges---Minus tides are necessary for bivalve collections at all of the walk-up sites. Tide ranges of 6 to 16 feet also need to be considered.

- Coastal Surf Conditions---This is a major safety consideration. Even with extreme minus tides, large swell or waves can still inundate a site and make access to the sampling location impossible.

- Weather (Major Storm Systems and Local Conditions)---Major storm systems can completely halt sampling operations, especially for sediment and bivalve sites on the open coast. Local conditions such as morning fog and strong afternoon winds have to be considered when planning boat operations. The possibility of road closures due to high winds, snow and ice also have to be considered.

- Boat Launch Facilities---The location and accessibility of boat launch facilities need to be considered in boat operation schedules.

- Dry Ice Availability---Dry ice is not available in some areas, and the field teams will need to bring sufficient amounts of dry ice with them.

- Private Property Access---Sufficient time will be needed to acquire any necessary permission and/or permits to gain access to private or government property.

- Day Light Access---This will need to be considered when planning sampling activities for bivalve sites located at the base of cliffs (safety considerations), on private property, or on bridges or pilings (safety considerations again).

- Transportation to Remote Island Sites---Sufficient time will be required to make flight arrangements and to receive permission to collect on island sites. Due to the primitive landing conditions at many of the island sampling sites, daylight access will be necessary.

- Notification of Fish and Game---The proper state collecting permits will be required, along with checking in with the appropriate agencies prior to collecting.

East Coast

Winter weather conditions have perhaps the greatest adverse influence on the field sampling for the East Coast, at least for the northeast sites. While the sites themselves are comparatively easy to sample, in contrast to the Gulf and West Coasts, the increased tidal ranges and the cold winter conditions and a very real potential for ice blockage in the protected waters of the northeast present some logistical and scheduling concerns which have to be taken into account in scheduling the field collections.

The availability of accessible boat ramps in the northeast is a problem during the winter months, as they are not well maintained (as during the peak tourist summer months) and quickly become covered by sand moved in by the winter storms. An additional problem is that the ramps are often inaccessible to boats at or near low tide (as they are left high and dry by the receeding waters), which is when one wishes to launch the vessel for the optimum sampling time for many of the intertidal sites.

The average distance between the sites also increases on the Atlantic coastline, especially from North Carolina through to Florida. These sites are typically the same as those found in the Gulf, but with an increased tidal range that has to be scheduled around.

Gulf Coast

Major logistical concerns in sampling the Gulf of Mexico oyster sites primarily involved access to the variety of sampling sites (and collection gear) and to a lesser degree permitting/politics. In the Caribbean, logistical concerns were much more complex since all collection gear had to be carried aboard airplanes and permitting and regional politics played a much larger role.

In the Gulf of Mexico, one major problem concerned accessibility to the oyster sites. Some samples were little trouble to obtain, such as from rock rubble beneath a highway bridge in Galveston, but some were difficult, such as ones that required a 35 mile drive from the nearest motel to the launch, a 15 mile boat ride through Louisiana marshes, and 10 miles alongshore in the open Gulf to a site that had to be sampled by dredging. Not only was this situation difficult, but the site was situated within a private lease which extended to all oyster bottoms in the bay system. It was owned by a family who initially met us at the boat launch and who were adamantly against our sampling from their lease. The site was located on what may be the most prolific oyster beds in Louisiana (and, therefore, on the entire Gulf coast), and was exposed to outflow from the entire Atchafalaya drainage basin.

Along the Gulf coastline, a relatively small, fast and seaworthy boat was needed that had a draft shallow enough to traverse the shallows en route to the site and to get on the reef for sampling. Proper equipment and navigational gear was also needed to safely cross the Mississippi Delta area, where landforms and bayous in and around the delta showed essentially no conformity to the most recent NOAA navigational charts, as was verified by our direct experience in the field and from very recent aerial photographs.

The other sampling extremes were typified by sites such as Cockroach Bay, which is only accessible with a very shallow draft boat and which required a two mile ride through an uncharted mangrove swamp and across oyster bars, over which the boat has to be dragged even on a flood tide. On the other hand, sites such as Dry Bar in Apalachicola (where dredges were absolutely forbidden) required about a 7 mile run across the open bay in the Boston whaler to a site so shallow that it was collected by hand while wading.

The distance between the Gulf sites measured 1500 nautical miles when the straight line distances between nearest sites were totalled. However, a single boat crew completing half the sites over the range from Laguna Madre to Naples drove over 8000 miles in a sampling season because of the limited and circuitous routes to launching ramps and sites.

In the Caribbean, transportation on land and on the water had to be arranged locally at each of the collection sites. There were few commercial or recreational boat rental sources; therefore, local fishermen had to be located at each collection site for which boats were needed. Local fishermen were sometimes hesitant to take scientists to their oyster harvesting areas since they believed that there could be some interference with their livelihood.

West Coast

Within the preceding classification scheme for coastline types, a number of environmental factors will play important roles in determining not only characteristic features of local topographies but also resident assemblages of fauna and flora. Such factors will include (1) tidal ranges and cycles, (2) direction and magnitude of winds, and (3) degree of wave exposure or shock. Substantial variations in tidal ranges can be encountered along the West Coast. For example, extremes in tidal heights at different locations can range from as low as <8 feet in Bahia San Quintin (Baja California) to >37 feet in Anchorage, Alaska. The West Coast site are also dominated by diurnal tidal cycles (both on a site per day basis aa well as on the periodicity of the lower low tide). Prevailing winds along the West Coast are generally northwesterly to westerly, with the obvious potential for extremely long fetches. Combinations of high winds, long fetches, and high tidal excursion ranges can produce conditions of extremely large surf and high degrees of wave shock in open coastal areas. In addition to effects that such conditions pose for natural physical and biological processes at particular locations, these conditions could have a very important bearing on sampling activities and time schedules for West Coast field surveys for the Period 3 Status and Trends Mussel Watch Program.

Permits

Collection of bivalves in all the affected states is regulated by the various state agencies, and in some cases by the U.S. National Parks Service. A scientific collecting permit was required prior to collection. In some instances, it was necessary to apply for two different permits to sample one site. FBJB - Florida Bay Joe Bay is located within the Everglades National Park, and requires both a Florida State and a National Parks Service Permit. Permit applications and letters were submitted to and obtained from the following agencies:

East Coast

Delaware - Marie Hand
Delaware Dept. of Natural Resources
P.O. Box 1401
Dover, DE 19903

Florida - Ms. Kat Ethridge
Florida Dept. of Environmental Protection
Division of Marine Resourses
3900 Commonwealth Blvd., Room 813
Tallahassee, Florida 32399-3000

Georgia -	Maggie Beacham Georgia Dept. of Natural Resources 2070 U.S. Hwy 278, S.E., Social Circle, GA 30279
Maine -	Ken Honey Maine Department of Marine Resources P.O. Box 8 West Boothbay, MA 04575
Maryland -	Mr. W.P. Jessen Maryland Dept. of Natural Resources Fisheries Division Tawes State Office Bldg. 580 Taylor Avenue Annapolis, MD 21401
Massachusetts -	Kevin Kriton Division of Marine Fisheries Leverett Saltonstall State Office Bldg. 100 Cambridge Street Boston, MA 02202
New Jersey -	Bruce A. Halgren Marine Fisheries Administration 501 East State Street, 3rd Floor Station Plaza 5 Trenton, NJ 08625
New York -	Dick Fox NY State Dept. of Environmental Conservation Division of Fish and Wildlife Special Licences Unit 50 Wolf Road Albany, NY 12233-4752
North Carolina -	Ramona McDonald Division of Marine Fisheries P.O. Box 769 Morehead City, NC 28557
Rhode Island -	David V.D. Barden Dept. of Environmental Management Div. of Fish, Wildlife and Estuarine Resources 4808 Tower Hill Road Wakefield, RI 02879

South Carolina - David Cupka
SC Dept. of Natural Resources
Marine Resources Division
P.O. Box 12559
Charleston, SC 29422

U.S. National Parks Service - Biscayne Bay
Ms. Diane Riggs
Biscayne Bay National Park
P.O. Box 1369
Homestead, FL 33090-1369

Virginia - William A. Pruitt
Virginia Marine Resources Commission
P.O. Box 756
Newport News, VA 23607-0756

Gulf Coast

Alabama - Ms. Cheryl Traylor
Dept. of Conservation and Natural Resources
Game and Fish Division
64 North Union Street
Montgomery, AL 36130

Florida - Ms. Kat Ethridge
Florida Dept. of Environmental Protection
Division of Marine Resourses
3900 Commonwealth Blvd., Room 813
Tallahassee, Florida 32399-3000

Louisiana - Ms. Karen Foote
Louisiana Dept. of Wildlife and Fisheries
Marine Fisheries Division
P.O. Box 98000
Baton Rouge, LA 70898-9000

Mississippi - Mr. Tom Van Devender
Miss. Dept. of Marine Resources
2620 Beach Blvd.
Biloxi, MS 39531

Puerto Rico - Mr. Javier Velez Arocho
University of Puerto Rico
Sea Grant Program
P.O. Box 5000 RUM-UPR
Mayaguez, Puerto Rico 00681-5000

Texas -	Mr. Steve Schwelling Texas Parks and Wildlife Dept. Permits Branch, Resource Protection Division 4200 Smith School Rd. Austin, TX 78744

U.S. National Parks Service - Everglades National Park
Vivie Thui
Everglades National Park
P.O. Box 279
Homestead, Fl 33030

West Coast

Alaska -	Cheryl Gallagher Alaska Dept. of Fish and Game Mariculture Coordinator C.F.M.D. Division P.O. Box 25526 Juneau, AK 99802-5526
California -	California Dept. of Fish and Game Monterey, CA (used Applied Marine Science (AMS) permit)
Oregon -	Jean McCray Oregon Dept. of Fish and Game (used AMS permit)
Washington -	Bob Foster Washington Dept. of Natural Resources (used AMS permit)

Sampling Gear

A complete list of all the sampling gear carried by each field crew (see Table 2) ensured that they were properly and thoroughly equipped to handle the particular sampling regimen. The field crews have all been trained to handle the contingencies of weather and mechanical breakdowns, and well versed in dealing with the expected/unexpected sampling routines.

Boats

Two boats were used during the course of the field collection period. They were both 17' Boston Whalers, equipped with an 88 hp engine with electric

Table 2. List of Sampling Gear.

Pick-up / Van Equipment

Cellular phone w/ antenna
Hydraulic jack
Spare wheel
Spare engine oil, & other fluids
Grease gun & spare grease
Jumper cables
Toolbox
12v circuit tester
Extension cord & 12v battery charger
Flashlight w/ spare batteries
Chain & padlock for boat
Boat hose and engine flusher
Spare boat tie down straps
Boat scrub brushes & soap
Boat trailer spare wheel
Spare trailer wheel bearings

General Supply Box (in the Pick-up / Van)

Past site logs w/ photographs
Tide books
NOS charts
Parallel rule, chart compass & dividers
State road maps
Hotel directory book
File Box w/ manuals (GPS, Loran, depthfinder, radio)
Scientific collecting permits
Federal Express book & forms
Envelopes - letter size; mailers (forms and log copies)
GERG & NOAA NS&T Mussel Watch Program flyers
Field sampling sheets
Tape (strapping, duct & white)
Office supplies (pens, pencils, markers, scissors)
35mm print film
Plastic garbage bags
Shipping coolers (large & small)
1.5v Batteries (size D & AAA)

Sampling Supply Box (in the Pick-up / Van)

Ziplock bags (2-gallon, gallon & quart)
Combusted 1-pint glass jars
Combusted aluminum foil
Spare squeeze bottles
Spare methanol
Spare methylene chloride
Contact cleaner (for electronics)
Paper towels
Whirlpacks
Spare 5 & 2 gallon buckets

Table 2. Continued.

Boat (Boston Whaler) Equipment
VHF radio w/ antenna
GPS unit w/ antenna
Loran-C unit w/ antenna
Depthfinder
Compass
Safety equipment (Air horn, flares, signal pistol)
Flashlight & 12v hand-held Halogen spot lamp
First aid kit
Tool kit w/ bolt cutters
Fire extinguisher
Radar reflector
Anchor, chain & rope
Paddles (2) & boat hook
Bailing bucket
10' Poling pole
Mooring line & boat fenders
Sea-anchor & rope
Spare mushroom anchor & rope
Emergency marker buoy, line & weight
Spare 5-gallon gas can w/ fuel
Spare propellor w/ nut kit
Outboard engine spare parts kit
Outboard engine oil (2-cycle) & starting fluid
Boat tie-down straps
Spare hand-held GPS unit
Spare hand-held VHF radio
Life Jackets (2) & throw cushion
Foul weather gear
Hip boots / Knee boots
Gloves (work, kevlar & neoprene)
Seaman's knife
Boat Sampling Equipment
SS oyster dredge & rope
SS oyster tongs & rake
SS sediment grab
Fish basket
Chipping Hammers
Oyster knives
Teflon coated sediment scoops
Thermometer
Refractometer
Hand-held compass
Paper towels
Bristle brush & soap
Sample coolers (large & small)
Dry ice / regular ice
Small wash tub / bucket

Table 2. Continued.

Boat Sampling Supplies
Scientific collecting permit
NOS chart
Clipboard w/ Field sampling forms
Past site logs w/ photographs
Sampling Manual
35mm Camera and print film
Office supplies (pens, markers, tape)
Tape (white, strapping & duct)
Tape measure
Site sample labels
Salinity bottles
Methylene chloride squeeze bottle
Methanol squeeze bottle
Combusted 1-pint glass jars
Combusted aluminum foil
Siphon hose
Shore Sampling Equipment/Supplies
Hand-held GPS unit w/ manual
NOS chart
Scientific collecting permit
Clipboard w/ Field sampling forms
Past site logs w/ photographs
Sampling Manual
35mm Camera and print film
Hand-held compass
Office supplies (pens, markers, tape, etc)
Tape measure
Site sample labels
Refractometer
Thermometer
Salinity bottles
Teflon coated sediment scoop
Methylene chloride squeeze bottle
Methanol squeeze bottle
Combusted 1-pint glass jars
Combusted aluminum foil
Gloves (work, kevlar & neoprene)
Bristle brush & soap
Small wash tub / bucket
Fish basket
Sample coolers (large & small)
Tape (white, strapping & duct)
Ziplock bags (2-gallon, gallon & quart)
Whirlpacks

tilt/trim and a jack-up plate for use in shallow water. These vessels provided the greatest versatility and utility in the sampling. Each boat was equipped with dual 12-gallon fuel tanks (giving a range of ~ 100 miles), a VHF radio, Raytheon 398 GPS, Raytheon 298 Loran C, a fathometer, and emergency/safety equipment. A handheld GPS receiver was used on the boats as a back-up system. The boats were trailered to a launch ramp near the sampling site, using either a pick-up or a large van. Due to the remote location of several sites, run times of over an hour were often required to get from the launch ramp to the sampling sites.

Navigational Equipment

Reoccupying established bivalve and sediment sites and establishing new ones requires the use of a combination of narrative description and electronic aids to navigation. As in our previous work with the Gulf of Mexico sites, we continued to use the Global Positioning System (GPS) as our primary navigational system. GPS provides a marked improvement in positioning capability over Loran C, and is just as economical to use. The system has an absolute accuracy way beyond that of the Loran C system, and is also considered to be far more reliable at the present time. Each of the boats is equipped with a GPS and a Loran C back-up navigational system. Hand-held GPS units were used to record all of the Latitude/Longitude positions of the walk-up sites. They were also carried as a back-up unit on the boats.

We have continued to provide and rely on pictures and narrative descriptions to differentiate the three stations within a site. It is hoped that in the near future we will be able to implement and use Differential GPS, that will enable us to accurately record the position of each station to within a 5 meter correction.

Communications

Both vessels were equipped with VHF marine radios. This allowed one to coordinate sampling activities between the boats when they worked simultaneously in close proximity, and kept one in contact with the Coast Guard and other vessels operating in the area if emergencies or difficulties arose. It also provides coastal weather conditions which are broadcasted continuously on the

VHF weather frequencies. A small waterproof handheld VHF radio was provided to each of the boat crews as an emergency backup system.

Each of the field crews were also equipped with a mobile phone, which could be used in either the vehicle or on the boat. This gave the crews the ability to have immediate voice contact and cut down on the number delays in the field. Questions concerning a particular site could be quickly resolved in the field by contacting the COTR.

Safety Considerations

Both boats were equipped with Coast Guard required safety and emergency equipment (life jackets, throw cushion, flares/signal pistol, lights, reserve fuel, first aid kit, etc.). GERG conducts extensive field activities, over 100 man months on oceanographic and environmental cruises per year, including over 50 weeks on chartered boats that are fully equipped and rigged out; thus, we were well aware of the applicable safety considerations and the consequences of failure to prepare for these contingencies on a field such as the NS&T Mussel Watch Program.

Sample Collection

Site Documentation

The locations of the bivalve and sediment sampling sites are accurately determined and documented, so that samples collected in subsequent sampling years will originate from the same background area. It is equally important to accurately determine the center of each sediment site (if not coincident with the bivalve site), so that valid comparisons can be made spatially among sites and temporally within each site. Therefore, each site is described on a Field Data Log with the following information: Site name and designating code, date, time, latitude, longitude, description of the site and access to the site, bivalve and sediment sampling technique, weather conditions, sea state and the collector's name and signature (see Table 3). A field data log is completed each time the site is visited, and the site description updated as necessary. The location of the site is also plotted on a NOS chart. Color photographs were taken, so as to ensure that the same area is sampled on the subsequent visits. Aerial photographs of the East

Table 3. Field Sampling Log Sheet.

GERG The Geochemical and Environmental Research Group TAMU

FIELD SAMPLING LOG SHEET 1993-1994

Site __________ Site # ______ Station __________ Date ___/____/____ (MM DD YY)

GPS Latitude ____° ____.____ ' **N** Longitude ____° ____.____ ' **W** **DGPS**_____

LORAN TD'S __________ __________ Sampling Intertidal ___ *or* Subtidal ___

Water Depth _____(m) Water Temp. ______ (°C) Salinity Sample _____(‰) _____

Time (24hr) Start ______ End ______ Cloud Cover _____(%) Sea State _______(ft)

Wind Spd _________ (kts) Coll. Gear (Sed) _________ (Oyst) ____________

	OYSTERS			**SEDIMENTS**	
Quantity	**Item**	**Sample#**	**Quantity**	**Item**	**Sample#**
1	Organic Jar	K______	1	Organic Jar	K_______
			1	Trace Metal	K_______
1	Trace Metal	K______	1	Grain Size	K_______
1	DVC & Length	**Initials**		**NBSB SITES**	
	Log complete	_______	**Quantity**	**Item**	**Initials**
20	Perkinsus Tubes	_______	2	Sediment Bag	________
1	Histo Jars	_______	2	Bag 30 Oysters	________

ANCILLARY DATA AND INFORMATION

Boat Launch ______________________________ Travel Time ______________

Site Access ____

Site Description (Land Marks, Prominent Features) ______________________

Oyster Description (Quantity, size) ______________________

Sediment Description (Color, texture, odor, etc.) ______________________

Other Comments ______________________

Initials ________

and Gulf Coast sites have been included with the site descriptions, which readily aids in identifying the position of the site.

Bivalve Identification

There are three major species of bivalves that are collected on the NS&T Mussel Watch Project, *Crassostrea virginica* - the Eastern Oyster, *Mytilus edulis* - the Blue Mussel and *Mytilus californianus* - the California Mussel. There is a debate as to whether or not *Mytilus edulis* is actually found on the U.S. west coast, or if the two species *Mytilus trossulus*, occurring in Northern California, Oregon and Washington, and *Mytilus galloprovincialis*, occurring in Southern California, are what was previously called *Mytilus edulis*. For the duration of this project, the west coast bivalve that is sampled and analyzed will continue to be called *Mytilus edulis*, until the academic issue is resolved by the relevant research scientists. The acceptable size range for mussels has been established at 5 - 8 cm, and 7 - 10 cm for oysters.

None of these three species occur in the warmer waters of the Florida Keys, so an alternate bivalve species *Chama sinuosa* - the Smooth-edge Jewel Box of the family *Chamidae*, was collected for analysis.

Bivalve Collections

Mytilus edulis is the species that is collected from Maine down to Delaware Bay, and on the West Coast. *Mytilus californianus* is the other and alternate West Coast species, primarily collected in California on the exposed headlands and outer coastal locations. *Crassostrea virginica* is collected from Delaware Bay south to the Lower Laguna Madre in Texas, with the exception of the site in the Florida Keys where *Chama sinuosa* is collected.

The bivalves were collected by hand, with stainless steel tongs, or by using a stainless steel dredge (see Table 1). Collection by hand was the method of choice and was used at intertidal and shallow subtidal sites. Loose bivalves were simply picked from the reef/substrate and were separated from any attached debris or other bivalves by using an oyster knife or a small chipping hammer. In the case of mussels where they are attached by byssel threads, a sharp knife or pair of scissors was used. At the deeper subtidal sites, the bivalves were collected using a stainless steel dredge. The clumps of bivalves and shell were then separated into individuals as before. In some areas, where the use of a dredge is prohibited by a state restriction(e.g. in Florida, Apalachicola Bay), the subtidal sites are sampled using tongs. The bivalves were then separated from one another with an oyster knife or chipping hammer. The stainless steel tongs are also carried as a backup, in case the dredge is lost for one reason or another.

Sediment Collections

Where water depth permitted, sediments were collected by hand using a small Teflon-coated scoop. Prior to each use the scoop was washed with soap and water, then cleaned and rinsed with methanol and methylene chloride, to remove any trace of residual organics. The spent solvent was collected and returned to GERG for proper disposal. The upper 1 cm layer of sediment was removed using the scoop, and placed in a combusted 1-pint glass container. In water depths where direct sampling was not possible, a stainless steel Young modified Van Veen sediment grab on a rope was used to bring a sample of the substrate on board the boat. The Teflon-coated scoop was then used to remove the top 1 cm layer subsample for analysis. The sediment grab was cleaned in a similar manner to the Teflon scoop prior to each use. All the sampling equipment and techniques have been used and perfected on the NS&T Mussel Watch Program over the last ten years.

Field Processing

Salinity and Temperature

At each station at every site, the temperature of the surface water was recorded. Salinity was measured at the site with a temperature compensating refractometer, or a sample was collected and returned to the laboratory where salinities from a number of sites were measured at constant temperature with a calibrated refractometer.

Bivalve Processing

Bivalve processing was essentially completed at the site, whether on the boat or on the shore in the case of shore-accessed sites. As the samples were collected, they were seperated and labeled according to station and site. Efforts were made to retain organisms in the same size range for sampling, so that organisms pooled for the site analysis were of similar age or maturity. This also applied to the replicate samples that were collected from the sites. The processing protocols for bivalves are shown in Figure 1, and are as follows.

Cleaning and Sorting - The bivalves were scrubbed free of mud and debris while still at the collection site. Pure bristle brushes and water from the collecting site were used for the cleaning process. The bivalves were then sorted and counted so as to ensure that an adequate number of suitable specimens (35 - 50 specimens per station, depending on the sample size) had been collected for the analytical process. Obviously, if the bivalves were extremely small, a greater number were collected to ensure an adequate sample size. The bivalves were not opened in the field.

Field Sampling - Twenty bivalves were collected from each station at each site for Hydrocarbon Analysis. These bivalvess were triple wrapped in combusted aluminum foil, then double bagged in labelled Ziplock bags. Similarly, ten bivalvess were collected for a Trace Metal Analysis, and these were doubled bagged in labelled Ziplocks. Five bivalves were collected at each station at each site for a Histopathological Study. These were also placed in their own labelled double Ziplock bags. Each seperate sample from each of the three stations per site received its own labelled sample bag, ensuring that there was no mixing of the samples.

Storage and Shipping - All the samples were stored on ice in ice chests aboard the boat, until the day's sampling was completed. At that time, they were transferred to the shipping coolers / Freez-Safe insulated containers, which were packed with frozen blue ice / dry ice for shipping. The samples were then driven to the nearest Federal Express office for next-day delivery to the relevant analytical laboratory. Occasionally, the samples returned to the GERG laboratory with the returning field crew or use was made of a light aircraft to speed up the process.

Trace Organic Processing - The bivalves were washed again and collectively measured for an initial displacement volume. The tissue from twenty bivalves, from each of the 3 stations at each site, were excised from the shell and placed into a pint mason jar which had been combusted in a muffle furnace to completely remove trace organics. The tare and gross weight of the jar and contents (20 bivalves) were recorded on t he lab form, along with the individual

Field Sample Processing Protocol
Bivalve Sites

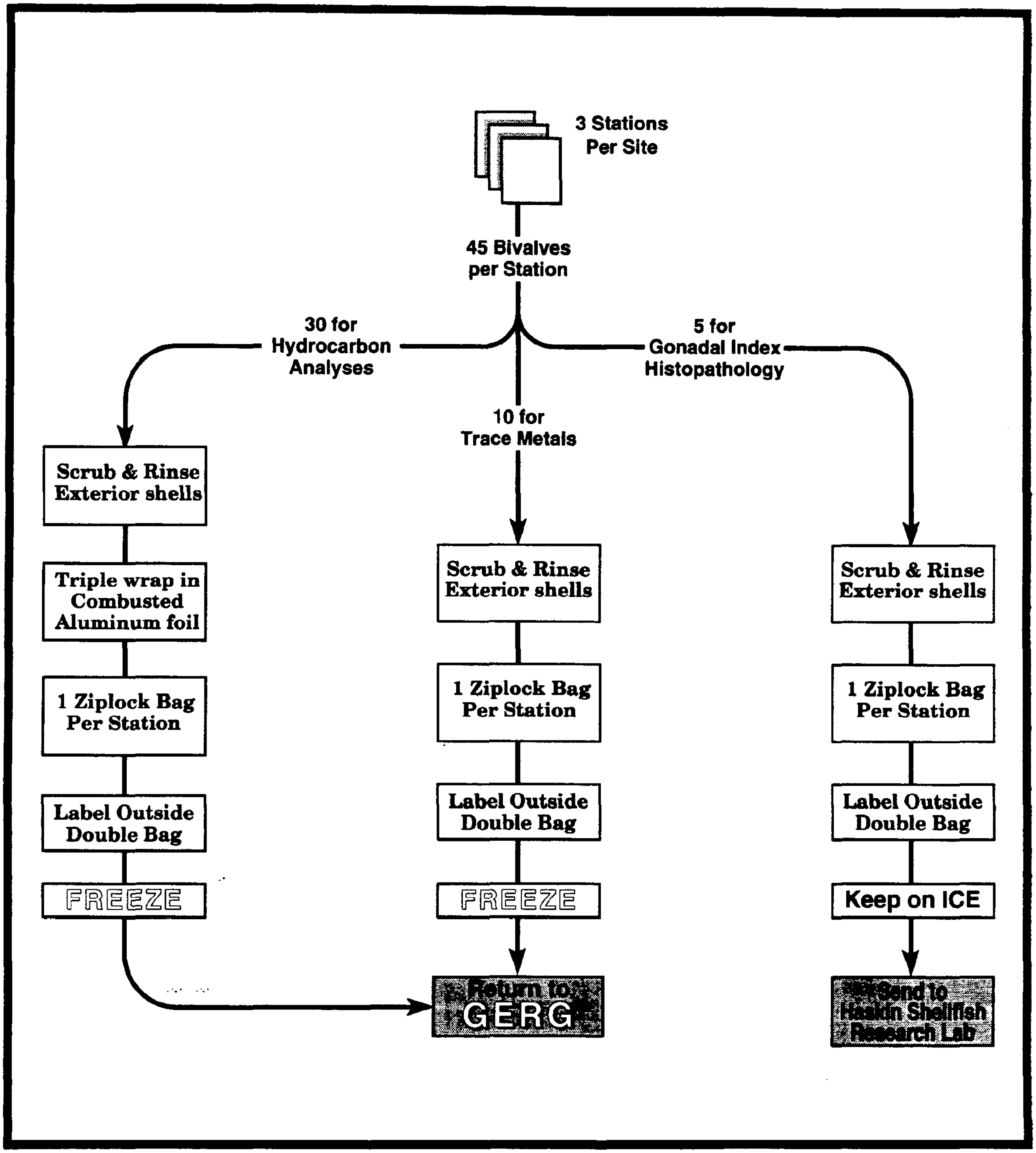

Figure 1. Field sample processing protocol for bivalve sites.

lengths of the oysters. A Teflon liner was placed under the jar seal, and the labeled sample jars (one for each of three stations in a site) were frozen in laboratory deep freezers.

Trace Metal Processing - Ten seperate bivalves from each of three stations within a site were washed again, then set aside in plastic trays for metal analyses. Because of their sharp edges and the need to ensure that they remained closed prior to processing, the bivalves had to be individually wrapped in singlefold paper towel and bound with rubber bands before they were double bagged in plastic trash bags, labeled and stored in the freezers. All opening and further processing of the bivalves (measurement of shell length and a displacement volume) was done at the analytical laboratories under clean room conditions.

Histopathological and Reproductive Study - Five bivalves from each of three sampling stations at every site were processed for a histopathological and gonadal development study. After the initial displacement volume of the washed sample was determined, along with their axial length, they were arranged on a stainless steel tray. Each bivalver was then opened with a solvent-washed stainless steel oyster knife, and the sample was fixed with Davidson's Fixative and tagged with a discrete ID number. A Meat Condition Index was completed on each individual sample, to rate the overall metabolic reserves and general condition of the individual. With the oyster samples, a cross section of the tissue was examined to determine the incidence of the oyster parasite *Perkinsus marinus*, that causes the deadly Dermo disease. Another complete cross section of gonadal tissue was excised from each specimen, embedded in paraffin wax and sectioned again. These sections were stained and then 'read'.

Sediment Processing

Sediment processing was essentially completed at the site, whether on the boat or on the shore in the case of shore-accessed sites. The processing protocols for sediment samples are shown in Figure 2.

Trace Organics and Trace Metals - The separate samples for organics and trace metals, contained in a pre-combusted half pint glass jar and a heavy duty pint zip-lock bag, respectively, were labeled and assigned a unique identifier code. They were shipped to GERG and stored in the freezers until analyzed.

Field Sample Processing Protocols

Sediment Sites

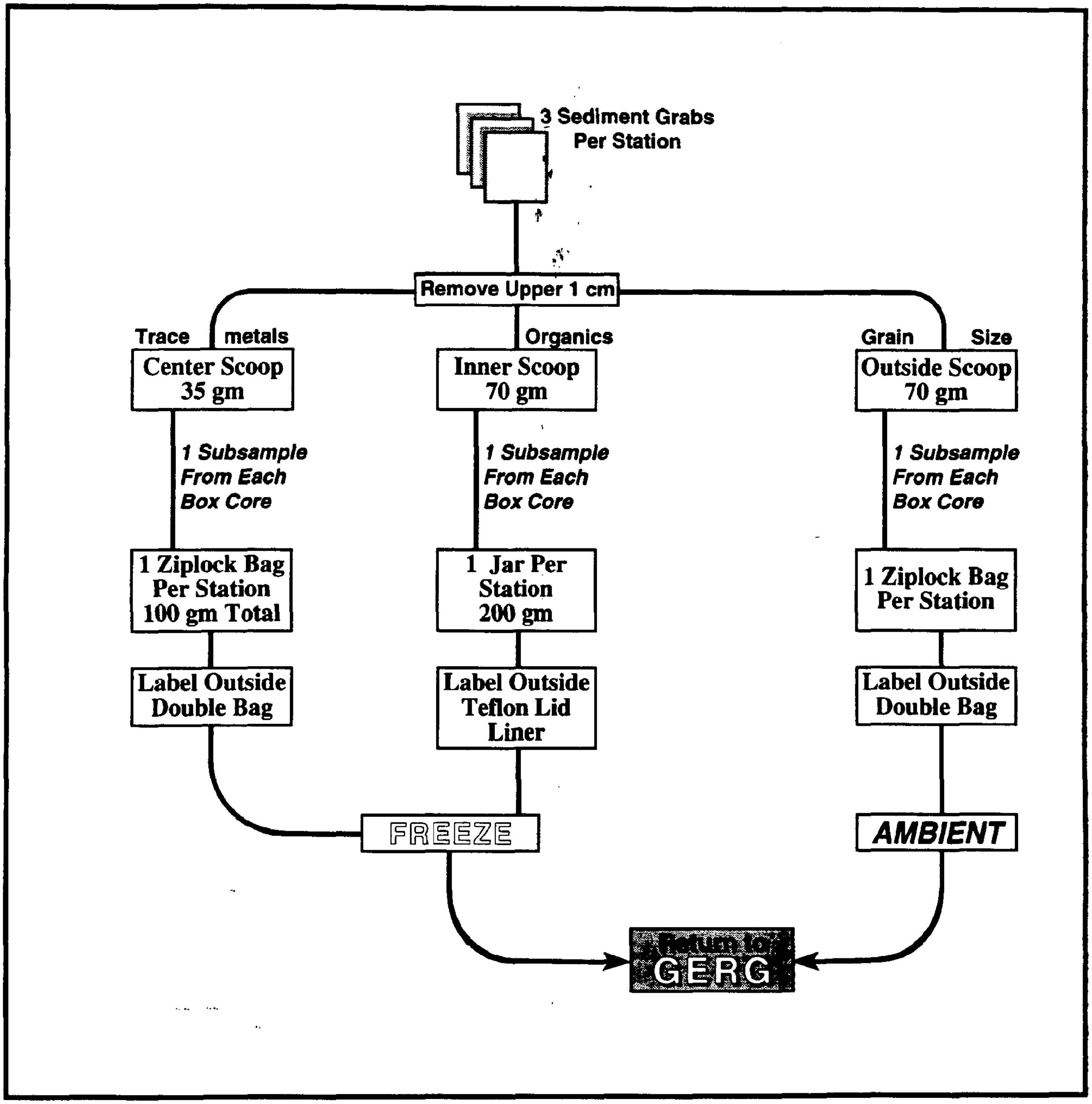

Figure 2. Field sample processing protocol for sediment sites.

Grain Size - Sediments collected for grain size analysis were stored in zip-lock or whirl-pack bags at ambient (above freezing) temperatures. As with the previous samples they were labeled with collection and site information and given a discrete identifier code.

Sediment Ancillary Measurement - Sediment ancillary measurements were run on aliquots of the samples taken for organic analyses; thus, no additional sampling or processing was required in the field.

Sample Handling and Chain-of-Custody

Sample collection was under the supervision of the field party chief who recorded the data and checked off the samples that were acquired against a prepared station list. Samples and copies of the data sheets were shipped to the laboratory manager at GERG. The lab manager supervised the processing of samples in the lab, the labelling, and the storing. The manager also prepared an inventory list of samples that were collected and were to be transferred. All samples and records were transferred to the Quality Control Manager who checked the samples against the prepared station list and stored the samples for subsequent disbursement to the different analytical groups and final storage.

Field Sampling Criteria

Definition of Stations and Sites

A site, the smallest geographic unit sampled, was selected to be representative of a target area, general location, or bay system. Once selected, the site was sampled at the same location each year. Within each site, three independent stations were sampled in order to characterize the site. Offshore subtidal sites were ~400 m radius circles. Latitude and longitude of the site was measured at the center of the circle. Shoreline intertidal sites were defined as 100 meter linear areas along the tidal horizon to either side of the site center. Sediment sites were, therefore, generally coincident with the bivalve sites. However, when the sediment at a subtidal bivalve sites did not meet the sampling criteria, separate sediment sites were then selected. If at all possible, these sites were located within 2 kilometers of and exposed to the same water mass as the bivalve site. The sequence of events in the selection of new site is shown in Figure 3.

Eighty-five (85) sites were established in the Gulf of Mexico and three (3) sites in the Caribbean during the first nine (9) years of the NS&T Mussel Watch Program. For the first six years of the study three stations at each site were sampled and each station was characterized by three replicate composite samples taken for sediment analysis and a composite bivalve sample made up of 20 oysters. The composite bivalve sample was made up of 7 to 8 oysters from each of the three stations. Selection of the three sampling stations was based on the historical locations as described for each individual site in this report.

Bivalve Site Selection Criteria

The bivalve sites were initially established, and are now sampled according to the following criteria:

- The site shall have indigenous bivalves of a suitable size (7-10 cm for *C. virginica or C. rhizophore*) which are available for collection annually. Other species to be collected may be specified by the COTR.
- The site shall integrate contaminant accumulation from nearby or surrounding areas and shall be outside the zone of initial dilution of a dumpsite or point-source discharge.
- The site should have sufficient bivalves, such that repeated annual harvesting will not seriously deplete the resource. Approximately 100 bivalves, of the larger species, would be collected requiring trace metal and organic analysis. Smaller species will need a correspondingly larger sample collection.
- The site should be suitable for follow-up sampling (e.g., not anticipated to be be physically disrupted by development activities or dredging).
- Sampling substrates will be limited to rock (including rip-rap and jetties), and sand or mud (or mangrove roots in the case of *C. rhizophorae*). Artificial structure such as pilings, and navigation aids will be avoided if possible in order to avoid potential point source contamination.
- Provided other criteria are met and where feasible, the bivalve sites should coincide with historical monitoring sites (e.g., USEPA Mussel Watch monitoring sites).

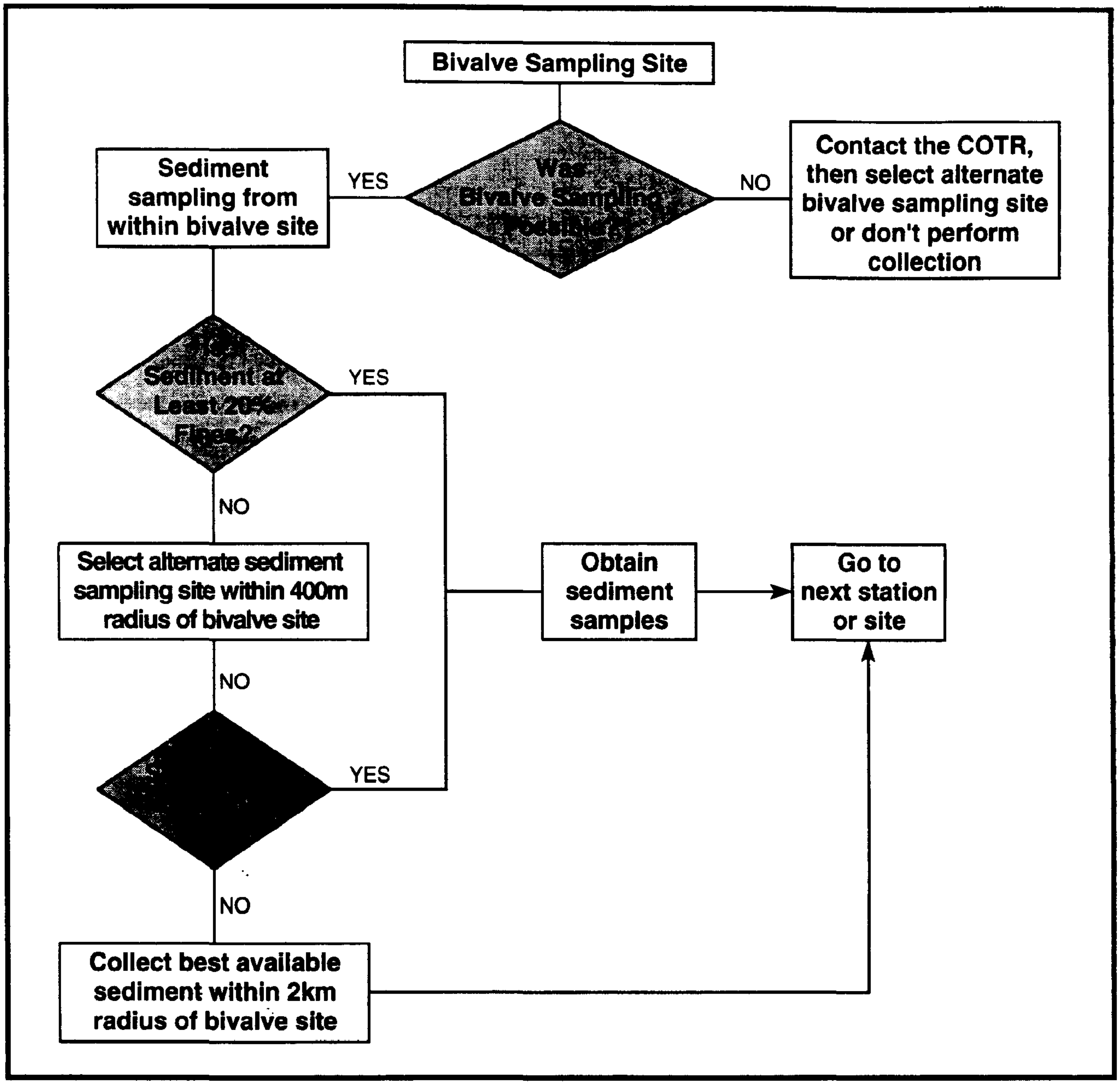

Figure 3. Decision criteria for sediment sites.

This year's field sampling effort has reoccupied as many of the historical sites as possible. It occasionally becomes necessary to relocate or abandon a few of the established oyster sites, due to one or more of the following circumstances:

- Bivalve populations were no longer present.
- A construction project or dredging activity precluded sampling.
- Collection of bivalves was logistically impossible or would endanger the field personnel.
- Permission to sample a site or gain access to a site was denied by a landowner or a leaseholder.

When another location was chosen for sampling, a determination was made by the COTR as to whether the new location was considered a minor "relocation" of the site or whether the new site was significantly different and should have been considered a newly established site. Newly established sites were assigned a new site name and unique site codes. Sites minimally relocated could retain the same name or could be renamed if the new name better signified the relocated site. The site code reflects the site's name and location, eg: GBFR - Galveston Bay Frenchy's Reef.

Sediment Site Selection Criteria

In most cases sediment sampling coincides closely to the bivalve stations. Because of the affinity of the target species for and the ubiquitous distribution of depositional zones in Gulf of Mexico estuaries, coincident sediment and bivalve sampling was generally not difficult. The specific criteria for sediment sites were:

- The site shall be subtidal (never exposed at lowest tides), low energy depositional area, as evidenced by yielding surficial sediments that contain at least 20% fine grained material ($\leq$ 64 microns) on a dry weight basis.
- The site shall be exposed to the same water mass as the corresponding bivalve site,
- The site should be located as near as possible to, and preferably not more than 2 kilometers, from the bivalve site,

- The site shall integrate contaminants from multiple sources in the surrounding area but shall not reflect inputs from an individual point source of contamination.

- Previously sampled or historical Mussel Watch locations (e.g., U.S. EPA sites) should be included/reoccupied where possible.

Field personnel were responsible for determining the suitability of the sediment sample. Only sites which were minimally (40 percent) fine sediment (silt and clay) were sampled for sediments. Samples that did not meet this grain-size criteria were not analyzed for the trace elements and trace organics. Therefore, grain size determinations were made prior to the chemical analysis in the laboratory. If acceptable sediments can not be located within the established sediment site, then the COTR would be contacted and the possibility of the relocation of the site discussed.

Sampling Summary

Sampling Problems

It has been our intent to sample the locations prescribed by NOAA during Years I through X of the program. However, in the field we have found that at a few sites, many factors worked against this both in the initial first year sampling and then again in the subsequent years when we returned to resample the same sites or new sites. Some of the prescribed locations could not be used because when we examined them in the field, they did not meet the most basic site selection criteria. For example, Tiger Pass in the Mississippi River (MRTP) was a dead reef and an alternate site at another location was substituted - Malheureux Point in Lake Borgne (LBMP). A similar substitution was made for the Turtle Bay in Barataria Bay (BBTB).

Minor shifts in sampling sites have been required between sampling years to accommodate yearly fluctuations in the abundance and availability of oyster populations at chosen sites. When these minor changes were required, we attempted to maintain the sampling stations as near the original location as possible. Whenever this situation arises, the COTR is contacted by the field crew to authorize the necessary changes in location. We expect this practice to continue over the course of the study as we anticipate recurring problems such as dredge material burying the entire reef, eg. Ingleside Cove in Corpus Christi Bay (CCIC) and the ShipChannel site in Galveston Bay (GBSC), our inability to relocate our sampling stations on the very small submerged reefs in the absence of navigational references or aids in close proximity, eg. Pass a Loutre on the Mississippi River (MRPL), the near total depletion of public oyster beds by harvesting, disease, and predators, eg. Oyster Bayou in Atchafalaya Bay (ABOB), and the depletion of available oysters attributable to sampling for this study, eg. Hillsborough Bay in Tampa Bay (TBHB). Thus, in some instances, it has not been possible to return to the precise site locations sampled in the previous year. Ensuring continued sampling at the same stations for all sites will require the relocation of some of the prescribed sites perhaps some distance from the original selected location.

The sediment sites were to coincide with bivalve sampling sites, inasmuch as fine grained depositional sediments may be co-located with the oyster reefs. The primary determining factor in sediment sampling was that the sediment contain less than 80% sand or coarser fraction. While we have been unable to devise a method which would confirm this compliance in the field, every effort was made to obtain sediments of as fine a texture as we could subjectively determine. In most cases, this was not a problem, as sediments adjacent to the reef were indeed of fine texture. However, in some cases, it was difficult to find the necessary sediments. These sites, as well as others, were characterized by broad expanses of sand and carbonate sediments. Fine grained silts and muds were either completely absent or confined to dredged canals used for recreational boating quite distant from the bivalve collection site. Thus, sediments from some areas will not meet the requirement for being more than 20% silt and clay, or they will be so far removed from the bivalve site that they will not represent the integrated contaminant accumulations to which the bivalves have been exposed. A few sites have been dropped from the sediment sampling list as there are no suitable sediments to be found in the immediate surrounding area.

In Year X (1995), there was no scheduled sediment sampling for the entire program, other than that for the new sites in Alaska. However, 50 sets of sediment samples were collected in Texas as part of the TDNR inventory study, which was sampled in conjunction with the NS&T Mussel Watch Project.

Sampling Summary

Relatively few sites were devoid of any bivalves, to a degree that an adequate number could not be collected to satisfy the sampling regimen. Only six NS&T Mussel Watch sites were "dead", and alternate sites were sampled in their place. The sites were Hog Point in Chesapeake Bay (CBHG), Swan Point in the Potomac River (PRSP), the Ship Channel in Galveston Bay (GBSC), Harbor Island in Aransas Pass (ABHI), Ingleside Cove in Corpus Christi Bay (CCIC), and Arroyo Colorado in the Laguna Madre (LMAC). An additional six TDNR sites in Texas were also devoid of any live bivalves, there are as follows : (TBTR), (CBBS), (CBAR), (EMMR), (CCEF) and (CCSP).

A small number of sites were also moved a short distance, so as to sample in the same water body but in an area that had a more stable bivalve population. The Joe Bay site in Florida Bay (FBJB) was dead due to excessive freshwater run-off. There had been recent flooding in Central Florida, and the water percolates down through the Everglades and into Florida Bay. The site was moved some 400 meters to the south, into Trout Cove, where there was a healthy population of oysters. This "new" site was considered to be within the same body of water. Two other sites were also moved short distances. The Block Island site (BIBI) was located on the northern breakwater exiting Great Salt Pond on Block Island. There had been a severe winter storm prior to the sampling, and no live mussels were found on the northern breakwater. There were a few live mussels remaining on the southern breakwater, so the site was moved some 100 meters after consultation with the COTR. The Point La Jolla La Jolla (LJLJ) site was moved as the site was located in a small cove that was subjected to the full force of the Pacific Ocean swells/waves. The new nominal site center is about 0.25 miles west of the original site, towards the La Jolla Point.

Over the years there have been a number of name changes to the NS&T Mussel Watch sites, for one reason or another - incorrectly named to begin with, new name after the site was moved, etc. Postil Point in Choctawahatchee Bay (CBPP) was originally called Shirk Point Choctawahatchee Bay (CBSP). Shirk Point is actually on the other side of Boggy Bayou from Postil Point (Boggy Point), where the site is located. Two sites had their names changed this year, as they were originally incorrectly named. New Orleans in Lake Borgne (LBNO) is located just off the Gulf Outlet next to Lake Borgne. The new name of the site is Gulf Outlet Lake Borgne (LBGO). The other site is Gulf Outlet in Lake

Pontchartrain, located just off the New Orleans waterfront in Lake Pontchartrain. The new name for this site is New Orleans Lake Pontchartrain (LPNO).

The NS&T site at Oyster Bayou in Atchafalaya Bay was closed to the public and commercial oystering by the Louisiana Department of Fish & Wildlife, and the Health Department. There had been excessive freshwater run-off through the area and the oysters were considered to be a health hazard with potential fecal botulism.

The sites were all photographed to accurately record their locations, and the photos are included with the site descriptions. A few sites were unfortunately missed due to one of a number of factors, eg. insufficient light, extremely poor weather conditions and a number of camera malfunctions. The photographs for these sites will hopefulyl be taken next year.

The aerial photography was completed on two of the three coasts. Both the East and Gulf Coasts now have aerial photos that enable the viewer to have a better idea of the site local, conditions, etc. A few of the sites are still without these photographs, mainly due to very low cloud cover. However, one site could now be photographed as it is located just off a U.S. Air Force live bombing range that was in use while the photography was being undertaken - Neuse River Pamlica Sound (PSNR). It is hoped that the West Coast aerial photography will be completed during the 1995 - 1996 NS&T field season.

References

Lawrence, D.R. and G.I. Scott (1982) The determination and use of condition index of oysters. *Estuaries*, 5:23-27.

Parker, R.H. (1960) Ecology and distributional patterns of marine macro-invertebrates. Northern Gulf of Mexico by F.P. Shepard, F.B. Phleger, and T.H. van Andel in Recent Sediment, Northwest Gulf of Mexico. A Symposium Summarizing the Result of Work Carried on in Project 51 of the American Petroleum Institute 1951-1958. Scripps Institute of Oceanography, University of California, La Jolla, California.

Ricketts, E.F., J. Calvin, and J.W. Hedgepeth. Revised by David W. Phillips. (1985) *Between Pacific Tides*. Stanford University Press, Stanford, CA.

Appendix A

Field Station Data

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FIELD STATION DATA

Site Code	Site Name & Location	Deg Min Latitude	Deg Min Longitude	Type	M/D/Y Date	Collection Method	Bottom Type	Scientist	Species	(m) Depth	°C Temp	0/00 Salinity	Local Time High Water	Local Time Low Water	Tidal Reference	Tidal Range (m)
PBPI	PICKERING ISLAND PENOBSCOT BAY	44°15.89'	68°44.02'	B	3/21/95	H	R	Jobling	*M. edulis*	0.5	3	30	1:29	20:08	L. Deer Is.	3
PBSI	SEARS ISLAND PENOBSCOT BAY	44°27.40'	68°52.99'	B	3/20/95	H	M	Jobling	*M. edulis*	0.5	3	21	0:37	6:55	Belfast	3.1
MSSP	STOVER POINT MERRICONEAG SOUND	43°45.47'	69°59.86'	B	3/19/95	H	R	Jobling	*M. edulis*	0.5	6	30	0:04	6:17	Harpswell	2.7
CAKP	KENNEBUNKPORT CAPE ARUNDEL	43°20.72'	70°28.46'	B	3/18/95	H	R	Jobling	*M. edulis*	0.5	6	30	11:59	5:46	K-bunkport	2.6
CAGH	GAP HEAD CAPE ANN	42°39.46'	70°35.84'	B	3/18/95	H	R	Jobling	*M. edulis*	0.5	3	30	11:47	5:32	Rockport	2.6
SHFP	FOLGER POINT SALEM HARBOR	42°30.81'	70°50.65'	B	3/17/95	H	MR	Jobling	*M. edulis*	0.5	5	2	23:40	17:28	Salem	2.7
MBNB	NAHANT BAY MASSACHUSETTS BAY	42°25.19'	70°54.43'	B	3/17/95	H	R	Jobling	*M. edulis*	0.5	5	32	23:37	17:25	Nahant	2.7
BHDI	DEER ISLAND BOSTON HARBOR	42°21.44'	70°58.38'	B	3/14/95	H	R	Jobling	*M. edulis*	0.5	5	30	9:03	15:17	Deer Is.	2.8
BHDB	DORCHESTER BAY BOSTON HARBOR	42°18.13'	70°02.18'	B	3/13/95	H	M	Jobling	*M. edulis*	0.5	12	29	8:11	14:35	Neponset	2.9
BHHB	HINGHAM BAY BOSTON HARBOR	42°16.56'	70°53.00'	B	3/13/95	H	R	Jobling	*M. edulis*	0.5	8	32	8:22	14:40	Hingham	2.9
BHBI	BREWSTER ISLAND BOSTON HARBOR	42°20.59'	70°52.70'	B	3/22/95	H	R	Jobling	*M. edulis*	0.5	5	32	2:46	9:12	B. Light	2.7
MBNR	NORTH RIVER MASSACHUSETTS BAY	42°09.62'	70°44.55'	B	3/14/95	H	M	Jobling	*M. edulis*	0.5	5	5	9:22	15:53	N. River	2.6
DBCI	CLARKS ISLAND DUXBURY BAY	42°00.82'	70°38.19'	B	3/15/95	D	M	Jobling	*M. edulis*	5	5	33	9:54	16:23	Plymouth	2.9
CCNH	NAUSET HARBOR CAPE COD	41°47.75'	69°56.77'	B	3/16/95	H	MR	Jobling	*M. edulis*	0.5	5	33	11;03	17:41	N. Harbor	1.8
NBDI	DYER ISLAND NARRAGANSETT BAY	41°36.29'	71°18.31'	B	3/24/95	H	R	Jobling	*M. edulis*	0.5	5	29	1:40	19:43	S.Prudence	1.2
NBPI	PATIENCE ISLAND NARRAGANSETT BAY	41°39.14'	71°21.38'	B	3/24/95	H	R	Jobling	*M. edulis*	0.5	5	30	1:45	19:50	Greenwich	1.2
NBDU	DUTCH ISLAND NARRAGANSETT BAY	41°29.47'	71°24.01'	B	3/23/95	H	R	Jobling	*M. edulis*	0.5	5	30	0:34	18:20	Conanicut	1.2
BIBI	BLOCK ISLAND BLOCK ISLAND SOUND	41°11.82'	71°35.47'	B	3/26/95	H	R	Jobling	*M. edulis*	0.5	7	32	0:29	18:33	Block Is.	0.8
HRJB	JAMAICA BAY HUDSON RARITAN ESTUARY	40°34.00'	73°53.72'	B	12/15/94	H	MN	Adkison	*M. edulis*	0.5	6.3	28	5:46	12:04	Jamaica B.	1.5
HRUB	UPPER BAY HUDSON RARIATAN ESTUARY	40°41.36'	74°02.59'	B	12/18/94	H	RE	Adkison	*M. edulis*	0.5	7.1	23	7:31	14:13	Govern. Is.	1.3
HRLB	LOWER BAY HUDSON RARITAN ESTUARY	40°33.96'	74°03.05'	B	12/15/94	H	R	Adkison	*M. edulis*	0.5	6	21	5:40	11:50	Coney Is.	1.4
HRRB	RARITAN BAY HUDSON RARITAN ESTUARY	40°31.14'	74°11.07'	B	12/16/94	H	RN	Adkison	*M. edulis*	0.5	5.5	23	6:24	12:46	Princes B.	1.5
NYSH	SANDY HOOK NEW YORK BIGHT	40°29.25'	74°02.00'	B	12/18/94	D	SN	Adkison	*M. edulis*	21	7.2	25	7:38	14:16	Sandy Bay	1.4
NYLB	LONG BRANCH NEW YORK BIGHT	40°17.69'	73°58.72'	B	12/19/94	H	R	Adkison	*M. edulis*	0.5	7.3	32	7:48	14:18	L. Branch	1.3
NYSR	SHARK RIVER NEW YORK BIGHT	40°11.22'	74°00.54'	B	12/14/94	H	R	Adkison	*M. edulis*	0.1	8.4	30	4:40	22:47	Shark R.	1.2
DBCM	CAPE MAY DELAWARE BAY	38°58.93'	74°57.68'	B	12/20/94	H	R	Adkison	*M. edulis*	0.5	7	28	9;03	15:15	Cape May	1.4
DBBD	BEN DAVIS PT. SHOAL DELAWARE BAY	39°15.14'	75°18.17'	B	12/20/94	D	MN	Adkison	*C. virginica*	6	5.6	18	7:13	13:39	Cedar Creek	1.8
DBCH	CAPE HENLOPEN DELAWARE BAY	38°47.01'	75°07.23'	B	1/10/95	H	RE	Adkison	*M. edulis*	0.5	3.7	30	3:27	21:50	C.Henlopen	1.2
CBBO	BODKIN POINT CHESAPEAKE BAY	39°09.44'	76°24.29'	B	1/20/95	D	MN	Adkison	*C. virginica*	5	8.5	8	21:21	14:53	7'Knoll L.	0.3
CBMP	MOUNTAIN POINT BAR CHESAPEAKE BAY	39°04.32'	76°24.76'	B	1/17/95	D	MN	Shannon	*C. virginica*	3.5	4	-	19:26	12:43	Mt. Point	0.2
CBHP	HACKETT POINT BAR CHESAPEAKE BAY	38°58.17'	76°24.88'	B	1/17/95	D	MN	Shannon	*C. virginica*	2.5	5	10	18:19	11:27	Sandy Pt.	0.2
CBCP	CHOPTANK RIVER CHESAPEAKE BAY	38°36.44'	76°07.20'	B	1/12/95	D	MN	Adkison	*C. virginica*	4	4	24	13:43	6:38	Cambridge	0.5
CBHG	HOG POINT CHESAPEAKE BAY	38°18.74'	76°23.87'	Dead	1/13/95	D	MN	Adkison	*C. virginica*	6	4.9	-	12:18	5:04	Cedar Pt.	0.4
PRRP	RAGGED POINT POTOMAC RIVER	38°09.30'	76°36.05'	B	1/16/95	D	MN	Shannon	*C. virginica*	3.5	7	4	13:45	20:04	Ragged Pt.	0.5
PRSP	SWAN POINT POTOMAC RIVER	38°16.90'	76°56.02'	Dead	1/16/95	D	MN	Shannon	*C. virginica*	4	-	-	14:01	20:49	Colonial B.	0.5
PRMC	MATTOX CREEK POTOMAC RIVER	38°13.40'	76°57.69'	B	1/16/95	D	MN	Shannon	*C. virginica*	3	8	10	14:01	20:49	Colonial B.	0.5
RRRR	ROSS ROCK RAPPAHANNOCK RIVER	37°54.12'	76°47.27'	B	1/14/95	D	MN	Adkison	*C. virginica*	3	6.8	10	11:23	5:19	Wares Wh.	0.5
CBCI	CHINTOTEAGUE INLET CHINTOTEAGUE BAY	37°56.31'	76°22.55'	B	1/8/95	H	NG	Adkison	*C. virginica*	0.5	3	30	1:28	20:11	Chinco. Is.	0.5
QIUB	UPSHUR BAY QUINBY INLET	37°31.50'	75°42.83'	B	1/19/95	H	MN	Shannon	*C. virginica*	0.5	8.5	32	9:06	15:34	Quinby In.	1.2
CBCC	CAPE CHARLES CHESAPEAKE BAY	37°17.07'	76°00.92'	B	1/9/95	H	NG	Adkison	*C. virginica*	0.5	5.3	22	2:57	21:33	C. Charles	0.7
CBDP	DANDY POINT CHESAPEAKE BAY	37°05.90'	76°17.69'	B	1/18/95	H	MG	Shannon	*C. virginica*	0.5	8.5	21	9:26	16:13	Back R.	0.7
CBJR	JAMES RIVER CHESAPEAKE BAY	37°03.92'	76°37.93'	B	1/18/95	D	MN	Shannon	*C. virginica*	3.5	8	8	11:16	17:57	Burwell B.	0.7
RSJC	JOHN CREEK ROANOKE SOUND	35°53.39'	75°38.02'	B	1/21/95	D	MN	Adkison	*C. virginica*	1	8.5	20	-	-	Pamlico S.	0.1
PSCH	CAPE HATTERAS PAMLICO SOUND	35°12.18'	75°42.96'	B	1/21/95	H	MN	Adkison	*C. virginica*	0.5	10	29	10:18	16:36	C.Hatteras	0.6
PSWB	WYSOCKING BAY PAMLICO SOUND	35°24.74'	76°02.38'	B	1/22/95	D	MN	Adkison	*C. virginica*	3	7.7	22	-	-	Pamlico S.	0.1
PSPR	PUNGO RIVER PAMLICO SOUND	35°17.76'	76°29.35'	B	1/23/95	D	MN	Adkison	*C. virginica*	2	7.6	11	-	-	Pamlico S.	0.1
PSNR	NEUSE RIVER PAMLICO SOUND	35°05.34'	76°31.32'	B	1/23/95	D	MN	Adkison	*C. virginica*	5	8.5	21	-	-	Pamlico S.	0.1
CFBI	BATTERY ISLAND CAPE FEAR	33°54.95'	78°00.21'	B	1/24/95	H	MN	Shannon	*C. virginica*	0.5	8.5	10	1:23	20:07	Southport	1.2

BOTTOM: S=SHELL,M=MUD,E=CONCRETE,N=SAND,G=GRASS,H=HASH,C=CLAY,R=ROCK,B=RUBBLE COLLECTION METHOD: H=HAND,T=TONGS,D=DREDGE,R=RAKE SAMPLE TYPE: B=BIVALVE,S=SEDIMENT

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FIELD STATION DATA

Site Code	Site Name & Location	Deg Min Latitude	Deg Min Longitude	Type	M/D/Y Date	Collection Method	Bottom Type	Scientist	Species	(m) Depth	°C Temp	0/00 Salinity	Local Time High Water	Local Time Low Water	Tidal Reference	Tidal Range (m)
SRNB	NORTH BAY SANTEE RIVER	33°10.37'	79°14.56'	B	1/24/95	D	MNS	Shannon	*C. virginica*	2	8.6	1	1:13	20:09	Cedar Is.	1.3
SRTI	TYBEE ISLAND SAVANNAH RIVER ESTUARY	32°00.99'	80°57.97'	B	2/20/95	H	MN	Shannon	*C. virginica*	0.2	15	18	10:03	4;03	Beach H.	2.1
SSSI	SAPELO ISLAND SAPELO SOUND	31°23.57'	81°17.28'	B	2/21/95	H	MN	Shannon	*C. virginica*	0.2	13	27	11:02	17:26	Old Tower	2.1
ARWI	WOLFE ISLAND ALTAMAHA RIVER	31°19.45'	81°18.65'	B	2/21/95	H	SH	Shannon	*C. virginica*	0.2	13	1	11:15	17:58	Wolfe Is.	2
SJCB	CHICOPIT BAY ST. JOHNS RIVER	30°22.86'	81°26.40'	B	2/18/95	H	MN	Shannon	*C. virginica*	0.5	14	30	10:00	3:12	Pablo Creek	1.2
MRCB	CRESCENT BEACH MATANZAS RIVER	29°45.84'	81°15.71'	B	2/18/95	H	MN	Shannon	*C. virginica*	0.2	19	35	16:06	10:15	Palmetto	0.3
IRSR	SEBASTIAN RIVER INDIAN RIVER	27°49.77'	80°28.46'	B	2/17/95	H	MN	Shannon	*C. virginica*	0.2	27	14	8:02	1:47	Sebastian	0.7
NMML	MAULE LAKE NORTH MIAMI	25°56.26'	80°08.98'	B	2/17/95	H	MN	Shannon	*C. virginica*	0.1	26	8	10:48	4:35	Sunny Isle	0.5
BBGC	GOULD'S CANAL BISCAYNE BAY	25°32.00'	80°19.39'	B	2/16/95	H	MN	Shannon	*C. virginica*	0.2	30	15	9:14	3:28	Cutler	0.6
FBJB	JOE BAY FLORIDA BAY	25°12.53'	80°32.00'	B	1/24/95	H	NG	Jobling	*C. virginica*	0.5	18	2	20:49	4:25	Flamingo	0.61
FBFO	FLAMINGO FLORIDA BAY	25°08.47'	80°55.43'	B	1/23/95	H	N	Jobling	*C. virginica*	1.0	24.5	28	19:53	3:11	Flamingo	0.61
EVFU	FAKA UNION BAY EVERGLADES	25°54.16'	81°30.84'	B	1/23/95	H	ST	Jobling	*C. virginica*	0.5	16	7	18:52	1:20	Pumpkin B.	0.64
NBNB	NAPLES BAY NAPLES BAY	26°06.75'	81°47.13'	B	1/22/95	H	SR	Jobling	*C. virginica*	0.5	20	30	18:47	12:22	Naples Bay	0.63
CBBI	BIRD ISLAND CHARLOTTE HARBOR	26°30.86	82°02.07'	B	1/22/95	H	SR	Jobling	*C. virginica*	0.5	17.5	10	18:26	11:33	Galt Island	0.64
CBFM	FORT MEYERS CHARLOTTE HARBOR	26°33.50'	81°55.37'	B	1/22/95	H	SE	Jobling	*C. virginica*	0.5	16	1	19:16	13:19	Cape Coral B	0.30
CKBP	BLACK POINT CEDAR KEY	29°12.40'	83°04.17'	B	1/21/95	H	SM	Jobling	*C. virginica*	0.5	7	12	16:25	10:03	Cedar Keys	0.79
AESP	SPRING CREEK APALACHEE BAY	30°03.80'	84°19.32'	B	1/19/95	H	SR	Jobling	*C. virginica*	0.5	17	17	2:59	9:31	Shell Point	0.80
APCP	CAT POINT BAR APALACHICOLA BAY	29°43.45'	84°53.05'	B	1/20/95	H	SN	Jobling	*C. virginica*	0.5	10	7	4:40	11:43	Cat Point	0.67
APDB	DRY BAR APALACHICOLA BAY	29°40.35'	85°03.94'	B	1/20/95	H	SR	Jobling	*C. virginica*	0.5	14.5	29	5;03	12:25	Apalach. B.	0.46
SAWB	WATSON BAYOU ST. ANDREW BAY	30°08.55'	85°37.93'	B	1/19/95	H	SB	Jobling	*C. virginica*	0.5	15.5	35	23:17	9:19	Panama C.	0.43
PCMP	MUNICIPAL PIER PANAMA CITY	30°09.07'	85°39.78'	B	1/19/95	H	SE	Jobling	*C. virginica*	2.0	15	27	23:17	9:19	Panama C.	0.43
PCLO	LITTLE OYSTER BAY PANAMA CITY	30°15.08'	85°40.86'	B	1/18/95	H	N	Jobling	*C. virginica*	0.5	17.5	24	23:45	10:09	North Bay	0.49
CBSR	SANTA ROSA CHOCTAWATCHEE BAY	30°24.70'	86°12.28'	B	1/18/95	T	NRM	Jobling	*C. virginica*	2.5	13.5	15	23:24	11:09	East Pass	0.18
MSBB	BILOXI BAY MISSISSIPPI SOUND	30°23.55'	88°51.45'	B	1/17/95	H	NE	Jobling	*C. virginica*	0.5	15	11	22:43	9:07	Biloxi	0.55
LPNO	NEW ORLEANS LAKE PONTCHARTRAIN	30°02.18'	90°02.48'	B	1/16/95	D	M	Jobling	*C. virginica*	1.0	12	8	-	-	New Orleans	-
LBGO	GULF OUTLET LAKE BORGNE	29°56.5'	89°50.02'	B	1/16/95	D	NM	Jobling	*C. virginica*	4.0	12	4	2:02	13:38	Shell Beach	0.40
LBMP	MALHEUREUX POINT LAKE BORGNE	29°52.02'	89°40.71'	B	1/16/95	H	BM	Jobling	*C. virginica*	0.5	12	7	1:27	13:12	Shell Beach	0.40
BSBG	BAY GARDERNE BRETON SOUND	29°36.12'	89°37.65'	B	1/15/95	H	M	Jobling	*C. virginica*	0.5	13	5	21:46	8:49	Gardner Is.	0.46
MRTP	TIGER PASS MISSISSIPPI RIVER	29°08.69'	89°25.67'	Dead	1/15/95	D	NT	Jobling	*C. virginica*	1.0	-	-	19:31	6:00	SW Pass	0.40
BBMB	MIDDLE BANK BARATARIA BAY	29°16.60'	89°56.52'	B	1/13/95	H	SM	Jobling	*C. virginica*	0.5	16.5	20	20:08	6:27	Barataria P.	0.37
BBSD	BAYOU ST. DENIS BARATARIA BAY	29°24.29'	89°59.93'	B	1/13/95	D	NS	Jobling	*C. virginica*	1.5	17	14	21:40	9:50	Manilla	0.30
BBTB	TURTLE BAY BARATARIA BAY	29°30.67'	90°05.00'	Dead	1/14/95	H/D	M	Jobling	*C. virginica*	1.0	16	7	22:17	10:23	Manilla	0.30
CLCL	CAILLOU LAKE CAILLOU LAKE	29°15.19'	90°55.60'	B	1/12/95	D	M	Jobling	*C. virginica*	1.0	17.5	10	18:26	5:43	Caillou Bay	0.52
ABOB	OYSTER BAYOU ATCHAFALAYA BAY	29°15.33'	91°08.17	B	1/12/95	H	SM	Jobling	*C. virginica*	0.5	17	18	16:35	4:13	Ship Shoal	0.49
VBSP	SOUTHWEST PASS VERMILLION BAY	29°34.77'	92°03.06	B	1/11/95	D	SM	Jobling	*C. virginica*	2.0	13	8	15:18	6:32	SW Pass	0.49
JHJH	JOSEPH HARBOR BAYOU J. HARBOR	29°38.21'	92°46.01'	B	1/10/95	H	MSR	Jobling	*C. virginica*	0.5	15	22	12:56	4:49	Calcasieu P.	0.61
CLSJ	ST. JOHNS ISLAND CALCASIEU LAKE	29°49.76'	93°23.01'	B	12/19/94	D	MSR	Jobling	*C. virginica*	1.0	14.5	15	16:20	8:51	Calcasieu P.	0.61
SLBB	BLUE BUCK POINT SABINE LAKE	29°47.45'	93°54.38'	B	12/19/94	D	SM	Jobling	*C. virginica*	1.0	16	3	18:30	9:50	Sabine Pass	0.4
GBFR	FRENCHY'S REEF GALVESTON BAY	29°31.95'	94°36.00'	B/S	12/11/94	D	MR	Wilson	*C. virginica*	2.0	13	7	2:00	10:58	Gilchrist	0.36
GBHR	HANNA'S REEF GALVESTON BAY	29°28.82'	94°44.51'	B/S	12/11/94	D	MR	Wilson	*C. virginica*	2.0	23	4	2:38	10:25	Eagle Pt.	0.3
TBVT	VINGT-ET-UN REEF TRINITY BAY	29°33.06'	94°46.61'	B/S	12/13/94	D	MN	Wilson	*C. virginica*	1.0	13	0	3:23	11:25	Eagle Pt.	0.3
TBTR	TRINITY REEF TRINITY BAY	29°41.25'	94°51.50'	Dead	12/12/94	D	MN	Wilson	*C. virginica*	1.0	-	-	4:56	11:31	Pt. Barrow	0.34
TBDR	DOW REEF TRINITY BAY	29°38.80'	94°54.27	B/S	12/12/94	D	M	Wilson	*C. virginica*	2.0	13	3	9:29	12:07	Morgans Pt	0.3
GBSC	SHIP CHANNEL GALVESTON BAY	29°42.27'	94°59.58'	Dead	12/14/94	D	SM	Wilson	*C. virginica*	1.5	-	-	10:10	13:12	Morgans Pt	0.3
GBYC	YACHT CLUB GALVESTON BAY	29°37.32'	94°59.75'	B/S	12/14/94	D	M	Wilson	*C. virginica*	3.5	15	9	5:56	14:33	Clear Lake	0.27
GBRB	RED BLUFF REEF GALVESTON BAY	29°36.56'	94°58.67	B/S	12/14/94	D	MN	Wilson	*C. virginica*	2.5	15	10	5:56	14:33	Clear Lake	0.27
GBST	MARKER '63' REEF GALVESTON BAY	29°33.26'	94°54.93'	B/S	12/12/94	D	MN	Wilson	*C. virginica*	3.5	14	9	5:56	14:33	Clear Lake	0.27
GBRF	RED FISH BAR GALVESTON BAY	29°29.84'	94°51.61'	B/S	12/15/94	D	MN	Wilson	*C. virginica*	2.5	14	26	20:33	12:39	Eagle Pt.	0.3

BOTTOM: S=SHELL,M=MUD,E=CONCRETE,N=SAND,G=GRASS,H=HASH,C=CLAY,R=ROCK,B=RUBBLE   COLLECTION METHOD: H=HAND,T=TONGS,D=DREDGE,R=RAKE   SAMPLE TYPE: B=BIVALVE,S=SEDIMENT

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GBTD	TODD'S DUMP GALVESTON BAY	29°30.18'	94°53.76'	B/S	12/9/94	D	SM	Wilson	*C. virginica*	1.5	19	10	2:12	9:43	Eagle Pt.	0.3
GBDK	DICKINSON REEF GALVESTON BAY	29°27.68'	94°56.86'	B/S	12/9/94	T	M	Wilson	*C. virginica*	1.5	21	9	2:12	9:43	Eagle Pt.	0.3
GBDL	DOLLAR REEF GALVESTON BAY	29°26.52'	94°52.71'	B/S	12/13/94	D	NH	Wilson	*C. virginica*	2.5	15	10	2:12	9:43	Eagle Pt.	0.3
GBOB	OFFATS BAYOU GALVESTON BAY	29°17.04'	94°50.18'	B/S	12/16/94	H	B	Wilson	*C. virginica*	0-0.5	16	19	17:12	8:55	Jamaica B.	0.3
GBCR	CONFEDERATE REEF GALVESTON BAY	29°15.80'	94°54.98'	B/S	12/16/94	H	MN	Wilson	*C. virginica*	0-0.5	17	19	17:12	8:55	Jamaica B.	0.3
WBCL	CARANCAHUA LAKE WEST BAY	29°14.78'	95°00.91'	B/S	12/16/04	H	M	Wilson	*C. virginica*	0.3	17	16	17:12	8:55	Jamaica B.	0.3
WBCB	WEST BAY CHOCOLATE BAY	29°10.10'	95°07.96'	B/S	11/22/94	H	M	Jobling	*C. virginica*	0.5	22	17	22:45	14:35	Alligator Pt	0.27
CBBS	BASTROP BAY CHRISTMAS BAY	29°05.37'	95°10.68'	Dead	11/22/94	H/D	MSH	Jobling	*C. virginica*	1.0	23	-	22:38	14:33	Xmas Pt.	0.27
CBAR	ARCADIA REEF CHRISTMAS BAY	29°01.79'	95°12.34'	Dead	11/22/94	H/D	MSH	Jobling	*C. virginica*	1.0	21	24	22:38	14:33	Xmas Pt.	0.27
CBDB	DRUM BAY CHRISTMAS BAY	29°01.66'	95°13.74'	B/S	11/22/94	H	MC	Jobling	*C. virginica*	0.5	22	20	22:38	14:33	Xmas Pt.	0.27
BRFS	FREEPORT SURFSIDE BRAZOS RIVER	28°55.27'	95°20.37'	B/S	11/21/94	H	MC	Jobling	*C. virginica*	0.5	23	16	19:22	10:22	Freeport	0.54
BRCL	CEDAR LAKE BRAZOS RIVER	28°51.48'	95°27.88'	B/S	11/21/94	H	MSH	Jobling	*C. virginica*	0.5	26	22	19:22	10:22	Freeport	0.54
CLCB	CEDAR LAKE BAYOU CEDAR LAKE	28°49.91'	95°32.58'	B/S	11/21/94	H	M	Jobling	*C. virginica*	0.5	25	19	19:22	10:22	Freeport	0.54
EMBI	BIRD ISLAND EAST MATAGORDA	28°43.77'	95°46.00'	B/S	11/29/94	H	N	Shannon	*C. virginica*	0.5	20	25	14:13	6:39	Pt. Lavaca	0.21
MBEM	EAST MATAGORDA MATAGORDA BAY	28°42.67'	95°53.00'	B/S	11/29/94	D	N	Shannon	*C. virginica*	0.5	20	24	14:13	6:39	Pt. Lavaca	0.21
EMMR	3 MILE REEF EAST MATAGORDA	28°38.00'	95°56.50'	Dead	11/29/94	H	N	Shannon	*C. virginica*	1.0	-	-	14:13	6:39	Pt. Lavaca	0.21
MBDI	DOG ISLAND MATAGORDA BAY	28°38.42'	96°00.47'	B/S	12/1/94	H	C	Shannon	*C. virginica*	0.5	19	15	16:18	8:10	Pt. Lavaca	0.21
MBMI	MAD ISLAND REEF MATAGORDA BAY	28°37.15'	96°05.63'	B/S	12/1/94	H	M	Shannon	*C. virginica*	0.5	19	18	16:18	8:10	Pt. Lavaca	0.21
MBOL	OYSTER LAKE MATAGORDA BAY	28°36.83'	96°10.53'	B/S	11/30/94	H	CG	Shannon	*C. virginica*	0.2	20	20	15:19	7:23	Pt. Lavaca	0.21
MBTP	TRES PALACIOS BAY MATAGORDA BAY	28°38.98'	96°14.01'	B/S	11/30/94	H	CH	Shannon	*C. virginica*	0.5	18	16	15:19	7:23	Pt. Lavaca	0.21
MBCB	CARANCAHUA BAY MATAGORDA BAY	28°39.90'	96°22.98'	B/S	11/30/94	H	SR	Shannon	*C. virginica*	0.5	19	18	15:19	7:23	Pt. Lavaca	0.21
LBKB	KELLER BAY LAVACA BAY	28°35.81'	96°28.62'	B/S	12/7/94	H	N	Shannon	*C. virginica*	0.5	21	15	21:14	13:19	Pt. Lavaca	0.21
MBLR	LAVACA RIVER MATAGORDA BAY	28°39.62'	96°35.07'	B/S	12/6/94	H	NC	Shannon	*C. virginica*	0.5	21	27	20:34	12:26	Pt. Lavaca	0.21
MBGP	GALLINIPPER PT. MATAGORDA BAY	28°34.73'	96°33.78'	B/S	12/7/94	D	SMH	Shannon	*C. virginica*	2.0	22	12	21:14	13:19	Pt. Lavaca	0.21
MBPL	POWDERHORN LAKE MATAGORDA BAY	28°30.50'	96°29.40'	B/S	12/7/94	H	M	Shannon	*C. virginica*	0.5	22	15	21:14	13:19	Pt. O'Con.	0.15
ESBD	BILL DAYS REEF ESPIRITU SANTO	28°24.73'	96°27.04'	B/S	12/6/94	H	SNA	Shannon	*C. virginica*	0.3	21	25	20:34	12:26	Pt. O'Con.	0.15
ESJR	JOSEPHINE REEF ESPIRITU SANTO	28°20.16'	96°32.33'	B/S	12/6/94	D	M	Shannon	*C. virginica*	2.0	21	25	20:34	12:26	Pt. O'Con.	0.15
ESSP	SOUTH PASS REEF ESPIRITU SANTO	28°17.81'	96°37.33'	B/S	12/8/94	H/D	MR	Shannon	*C. virginica*	0.1-0.5	22	24	21:48	14:15	Pt. O'Con.	0.15
SAMP	MOSQUITO POINT SAN ANTONIO BAY	28°20.11'	96°42.49'	B/S	12/8/94	H	MN	Shannon	*C. virginica*	0-0.5	23	19	21:48	14:15	Pt. O'Con.	0.15
SAPP	PANTHER PT. REEF SAN ANTONIO BAY	28°14.00'	96°42.55'	B/S	12/8/94	D	MS	Shannon	*C. virginica*	2.0	23	19	21:48	14:15	Pt. O'Con.	0.15
SACF	CHICKEN FOOT REEF SAN ANTONIO BAY	28°16.26'	96°46.81'	B/S	12/12/94	H	MH	Shannon	*C. virginica*	0.5	18	10	23:29	6:48	Pt. O'Con.	0.15
MBAR	AYRES REEF MESQUITE BAY	28°10.38'	96°50.10'	B/S	12/13/94	H	MS	Shannon	*C. virginica*	0.5	17	20	23:49	7:21	Pt. O'Con.	0.15
ABLR	LONG REEF ARANSAS BAY	28°03.29'	96°57.07'	B/S	12/13/94	D	MNSG	Shannon	*C. virginica*	0 - 0.5	17	19	23:49	7:21	Aransas P.	0.42
ABCB	ST. CHARLES BAY PASS ARANSAS BAY	28°07.92'	96°58.12'	B/S	12/13/94	H	M	Shannon	*C. virginica*	0.5	17	17	23:49	7:21	Aransas P.	0.42
CBLP	LAP REEF COPANO BAY	28°08.56'	97°02.87'	B/S	12/14/94	D	M	Shannon	*C. virginica*	1.5	18	19	16:03	7:53	Aransas P.	0.42
CBCR	COPANO REEF COPANO BAY	28°08.52'	97°07.68'	B/S	12/14/94	H/D	M	Shannon	*C. virginica*	0.5	18	20	16:03	7:53	Aransas P.	0.42
ABHI	HARBOR ISLAND ARANSAS BAY	27°50.33'	97°04.52'	Dead	12/14/94	H	EB	Shannon	*C. virginica*	0.5	-	-	16:03	7:53	Aransas P.	0.42
CCEF	EAST FLATS REEF CORPUS CHRISTI	27°49.00'	97°07.50'	Dead	12/15/94	D	MN	Shannon	*C. virginica*	1.5	-	-	16:39	8:24	Aransas P.	0.42
CCRB	REDFISH BAY CORPUS CHRISTI	27°51.68	97°09.90	B/S	12/15/94	H	MN	Shannon	*C. virginica*	0.5	18	6	16:39	8:24	Aransas P.	0.42
CCSP	SHAMROCK POINT CORPUS CHRISTI	27°45.25'	97°11.00'	Dead	12/15/94	D	MN	Shannon	*C. virginica*	1.5	-	-	16:39	8:24	Aransas P.	0.42
CCIC	INGLESIDE COVE CHORPUS CHRISTI	27°50.28'	97°14.28'	Dead	12/15/94	D	MN	Shannon	*C. virginica*	0.5	-	-	16:39	8:24	Aransas P.	0.42
CCNB	NUECES BAY CORPUS CHRISTI	27°51.13'	97°21.59'	B/S	12/15/94	H	CSM	Shannon	*C. virginica*	0.5	19	30	16:39	8:24	Aransas P.	0.42
CCBH	BOAT HARBOR CORPUS CHRISTI	27°50.17'	97°22.81'	B/S	12/15/94	H	MSHB	Shannon	*C. virginica*	0.5	18	28	16:39	8:24	Aransas P.	0.42
NBOR	OYSTER REEFS NUECES BAY	27°50.33'	97°25.06'	Dead	12/16/94	D	MN	Shannon	*C. virginica*	2.0	-	-	17:12	8:55	Aransas P.	0.42
CCTB	TULE TURNING BASIN CORPUS CHRISTI	27°49.33'	97°26.46'	B/S	12/16/94	H	BN	Shannon	*C. virginica*	0.5	19	31	17:12	8:55	Aransas P.	0.42
LMTS	MARKER '27' LAGUNA MADRE	26°18.06'	97°17.86'	B/S	12/19/94	H	CG	Shannon	*C. virginica*	0.5	18	28	18:27	8:45	Padre Is.	0.42
LMAC	ARROYO COLORADO LAGUNA MADRE	26°16.80'	97°17.30'	Dead	12/19/94	H	HNG	Shannon	*C. virginica*	0.5	-	-	18:27	8:45	Padre Is.	0.42
LMFN	MARKER '49' LAGUNA MADRE	26°16.09'	97°16.87'	B/S	12/19/94	H	SH	Shannon	*C. virginica*	0.5	18	30	18:27	8:45	Padre Is.	0.42

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NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FIELD STATION DATA

Site Code	Site Name & Location	Deg Min Latitude	Deg Min Longitude	Type	M/D/Y Date	Collection Method	Bottom Type	Scientist	Species	(m) Depth	°C Temp	0/00 Salinity	Local Time High Water	Local Time Low Water	Tidal Reference	Tidal Range (m)
LMSF	MARKER '75' LOWER LAGUNA MADRE	26°12.82'	97°16.02'	B/S	12/19/94	H	N	Shannon	*C. virginica*	0.5	18	30	18:27	8:45	Padre Is.	0.42
LMPI	PORT ISABEL LOWER LAGUNA MADRE	26°03.90'	97°12.52'	B/S	12/20/94	H	N	Shannon	*C. virginica*	0.5	18	30	18:22	10:21	Pt. Isabel	0.4
LMSB	SOUTH BAY LOWER LAGUNA MADRE	26°02.60'	97°10.57'	B/S	12/20/94	H	CN	Shannon	*C. virginica*	0.5	18	-	18:22	10:21	Pt. Isabel	0.4
IBNJ	NORTH JETTY IMPERIAL BEACH	32°35.26'	117°08.01'	B	12/12/94	H	E	Hardin	*M. californianus*	0.5	14.9	24	5:25	12:32	Pt. Loma	1.13
SDCB	CORONADO BRIDGE SAN DIEGO BAY	32°41.19'	117°09.55'	B	12/14/94	H	E	Hardin	*M. edulis*	0.75	14.8	33	6:43	13:49	San Diego	1.31
PLLH	LIGHTHOUSE POINT LOMA	32°40.83'	117°14.93'	B	1/12/95	H	R	Hardin	*M. californianus*	1	15.4	25.5	6:10	13:32	Pt. Loma	1.13
SDHI	HARBOR ISLAND SAN DIEGO BAY	32°43.48'	117°11.68'	B	12/13/94	H	R	Hardin	*M. edulis*	0.5	15	34.5	6:10	13:14	San Diego	1.31
MBVB	VENTURA BRIDGE MISSION BAY	32°46.05'	117°14.52'	B	12/15/94	H	E	Hardin	*M. edulis*	0.75	14.3	35	7:11	14:38	Mission B.	1.16
LJLJ	POINT LA JOLLA LA JOLLA	32°51.09'	117°16.43'	B	1/13/95	H	R	Hardin	*M. californianus*	1	15.6	35	6:54	14:01	La Jolla	1.13
OSBJ	MUNICIPAL BEACH JETTY OCEANSIDE	33°12.10'	117°23.62'	B	1/11/95	H	R	Hardin	*M. californianus*	1	15.3	29	5:23	12:47	Oceanside	1.13
ABWJ	WEST JETTY ANAHEIM BAY	33°44.00'	118°06.06'	B	12/16/94	H	R	Hardin	*M. californianus*	0.75	16.6	32.5	8:34	15:59	Los Patos	1.04
PVRP	ROYAL PALMS STATE PARK PALOS VERDES	33°43.02'	118°19.37'	B	12/17/94	H	R	Hardin	*M. californianus*	0.75	16	24	8:03	15:17	L.A.	1.16
MDSJ	SOUTH JETTY MARINA DEL RAY	33°57.69'	118°27.50'	B	12/18/94	H	R	Hardin	*M. edulis*	0.5	16.1	25	8:37	15:54	S. Monica	1.07
PDPD	POINT DUME POINT DUME	34°00.10'	118°48.52'	B	12/19/94	H	R	Hardin	*M. californianus*	1	15.9	30	9:08	16:31	Pt. Mugu	1.13
SLSL	POINT SAN LUIS SAN LUIS OBISPO BAY	35°09.63'	120°45.35'	B	12/20/94	H	R	Hardin	*M. californianus*	0.5	12.3	29	10:25	16:44	Pt. San L.	1.1
PGLP	LOVERS POINT PACIFIC GROVE	36°37.63'	121°54.99'	B	2/24/95	H	R	Hardin	*M. californianus*	1	14.1	35	5:28	12:42	Monterey	1.1
MBML	MOSS LANDING MONTEREY BAY	36°48.07'	121°47.38'	B	2/24/95	H	R	Hardin	*M. californianus*	0.5	17.4	33	5:26	12:41	Moss L.	1.07
MBES	ELKHORN SLOUGH MONTEREY BAY	36°48.59'	121°47.11'	B	2/28/95	H	E	Hardin	*M. californianus*	0.75	16.2	35	9:22	15:51	Elkhorn S.	1.07
MBSC	POINT SANTA CRUZ MONTEREY BAY	36°57.25'	122°01.48'	B	2/25/95	H	R	Hardin	*M. californianus*	1.25	15	35	6:27	13:28	Santa Cruz	1.07
SFDB	DUMBARTON BRIDGE SAN FRANCISCO	37°30.16'	122°07.28'	B	2/13/95	H	E	Gold	*M. californianus*	0.25	11.8	15	10:42	17:55	Dumbarton	2.01
SFSM	SAN MATEO BRIDGE SAN FRANCISCO	37°34.68'	122°15.22'	B	2/13/95	H	E	Gold	*M. californianus*	0.25	11.8	16.3	10:34	17:37	San Mateo	1.77
SFEM	EMERYVILLE SAN FRANCISCO	37°49.23'	122°19.80'	B	2/14/95	H	R	Gold	*M. californianus*	0	15	14.7	10:44	17:27	Berkeley	1.28
TBSR	SPENGER'S RESIDENCE TOMALES BAY	38°08.97'	122°54.24'	B	2/15/95	H	R	Gold	*M. californianus*	0.25	13	18	11:37	18:38	Tomales B.	1.1
BBBE	BODEGA BAY ENTRANCE BODEGA BAY	38°18.30'	123°03.96'	B	1/13/95	H	R	Gold	*M. californianus*	1.5	10.4	20	9:04	16:01	B. Harbor	1.16
PALH	LIGHTHOUSE POINT ARENA	38°57.18'	123°44.58'	B	1/12/95	H	R	Gold	*M. californianus*	1	11.9	17.7	8:17	15:23	Pt. Arena	1.22
PDSC	SHELTER COVE POINT DELGADA	40°01.35'	124°04.40'	B	1/29/95	H	R	Gold	*M. californianus*	1.75	10.8	20.7	9:03	16:02	Shelter C.	1.28
HMBJ	HUMBOLDT BAY JETTY EUREKA	40°45.85'	124°14.02'	B	12/28/94	H	R	Gold	*M. californianus*	1.5	10.9	20.3	7:20	14:48	Humbolt B.	1.31
EUSB	SAMOA BRIDGE EUREKA	40°49.29'	124°10.28'	B	12/31/94	H	E	Gold	*M. califor/edulis*	0.25	9.5	19.2	10:24	17:25	Samoa	1.65
SGSG	POINT ST. GEORGE CRESCENT CITY	41°44.87'	124°12.46'	B	12/30/94	H	R	Gold	*M. californianus*	1.75	10.2	20.3	8:56	16:09	Crescent C.	1.55
CBRP	RUSSELL POINT COOS BAY	43°25.59'	124°13.17'	B	12/12/94	H	E	Gold	*M. edulis*	0.5	7.9	15	8:29	15:41	Empire	1.49
YBOP	ONEATTA POINT YAQUINA BAY	44°34.51'	123°59.34'	B	12/13/94	H	W	Gold	*M. edulis*	1	7.5	14.7	9:02	16:23	Winant	1.92
YHFC	FOGARTY CREEK YAQUINA BAY	44°50.22'	124°03.12'	B	12/13/94	H	R	Gold	*M. edulis*	1.5	8.9	29	8:47	16:20	Taft	1.52
TBHP	HOBSONVILLE POINT TILLAMOOK BAY	45°32.83'	123°54.45'	B	12/14/94	H	R	Gold	*M. edulis*	1	8.2	8	9:52	17:04	Garibaldi	1.8
CRSJ	SOUTH JETTY COLUMBIA RIVER	46°13.72'	124°01.39'	B	1/30/95	H	R	Gold	*M. edulis*	0.5	6.9	17.7	0:18	18:29	Columbia	1.71
GHWJ	WESTPORT JETTY GRAY'S HARBOR	46°54.70'	124°07.03'	B	1/30/95	H	E	Gold	*M. californianus*	1	6.6	24.3	12:03	18:23	Westport	2.15
PSHC	HOOD CANAL PUGET SOUND	47°49.91'	122°41.31'	B	1/29/95	H	W	Gold	*M. californianus*	2	7.2	23.7	4:17	21:42	Lofall	2.12
SSBI	BUDD INLET SOUTH PUGET SOUND	47°05.96'	122°53.65'	B	12/15/94	H	E	Gold	*M. edulis*	0.5	7.5	23.3	5:11	22:27	Olympia	3.2
WIPP	POSSESSION POINT WHIDBEY ISLAND	47°54.27'	122°22.59'	B	12/16/94	H	R	Gold	*M. edulis*	0.5	8.1	29	5:05	22:19	Glendale	2.25
BBSM	SQUALICUM MARINA BELLINGHAM BAY	48°45.13'	122°29.87'	B	1/28/95	H	R	Gold	*M. edulis*	1.5	7.5	27	13:27	21:14	Bellingham	1.58
KTMP	MOUNTAIN POINT KETCHIKAN	55°17.63'	131°32.88'	B	4/16/95	H	R	Denton	*M. edulis*	0	8	30	0:41	7:02	Ketchikan	3.96
NBES	EAST SIDE NAHKU BAY	59°27.20'	135°20.19'	B	5/7/95	H	R	Pickett	*M. edulis*	0	11.5	12	5:35	12:17	Skagway	4.3
PWSH	SHEEP BAY PRINCE WILLIAM SOUND	60°38.44'	145°59.41'	B/S	3/30/95	H	R	Kennedy	*M. edulis*	0	4	33	0:31	6:41	Pt. Gravina	2.9
PWKH	KNOWLES HEAD - PWS	60°41.27'	146°34.57'	B/S	3/29/95	H	R	Reeder	*M. edulis*	0	3.5	30	0:04	18:18	Pt. Fidalgo	2.9
PVMC	MINERAL CREEK FLATS PORT VALDEZ	61°07.97'	146°27.66'	B	4/13/95	H	R	Kennedy	*M. edulis*	0	6	30	23:58	17:48	Pt. Valdez	2.96
UISB	SIWASH BAY UNAKWIK INLET	60°57.65'	147°38.76'	B	4/13/95	H	R	Kennedy	*M. edulis*	0	7	-	11:41	17:51	Glacier Is.	2.9

BOTTOM: S=SHELL,M=MUD,E=CONCRETE,N=SAND,G=GRASS,H=HASH,C=CLAY,R=ROCK,B=RUBBLE COLLECTION METHOD: H=HAND,T=TONGS,D=DREDGE,R=RAKE SAMPLE TYPE: B=BIVALVE,S=SEDIMENT

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FIELD STATION DATA

Site Code	Site Name & Location	Deg Min Latitude	Deg Min Longitude	Type	M/D/Y Date	Collection Method	Bottom Type	Scientist	Species	(m) Depth	°C Temp	0/00 Salinity	Local Time High Water	Local Time Low Water	Tidal Reference	Tidal Range (m)
PWDI	DISK ISLAND - PWS	60°29.58'	147°39.35'	B/S	3/28/95	H	R	Kennedy	*M. edulis*	0	3.5	30	11:38	17:49	Knight Is.	2.96
GASL	SLEEPY BAY GULF OF ALASKA	60°04.04'	147°49.53'	B/S	3/28/95	H	R	Reeder	*M. edulis*	0	6	31	11;25	17:42	Bainbridge	2.53
GAWB	WINDY BAY GULF OF ALASKA	59°13.12'	151°31.02'	B/S	3/20/95	H	R	Kennedy	*M. edulis*	0	2	30	3:24	9:50	Rocky Bay	3.2
CIHS	HOMER SPIT COOK INLET	59°36.87'	151°26.65'	B/S	3/13/95	H	M	Brooks	*M. edulis*	0	0	30	11:49	18:26	Homer	4.79
GASH	SHUYAK HARBOR GULF OF ALASKA	58°30.06'	152°37.31'	B/S	3/19/95	H	R	Kennedy	*M. edulis*	0	2.5	34	3:36	10:05	Shuyak Is.	2.74

BOTTOM: S=SHELL,M=MUD,E=CONCRETE,N=SAND,G=GRASS,H=HASH,C=CLAY,R=ROCK,B=RUBBLE COLLECTION METHOD: H=HAND,T=TONGS,D=DREDGE,R=RAKE SAMPLE TYPE: B=BIVALVE,S=SEDIMENT

Appendix B

Final Positions

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - EAST COAST

GERG #	Site Code	Site Name	Site Location	State	NOS Chart #	Deg. Min Latitude	Deg. Min Longitude
1	PBPI	Pickering Island	Penobscot Bay	ME	13305	44°15.89'	68°44.02'
2	PBSI	Sears Island	Penobscot Bay	ME	13309	44°27.40'	68°52.99'
3	MSSP	Stover Point	Merriconeag Sound	ME	13290	43°45.47'	69°59.86'
4	CAKP	Kennebunkport	Cape Arundel	ME	13286	43°20.72'	70°28.46'
5	CAGH	Gap Head	Cape Ann	MA	13279	42°39.46'	70°35.84'
6	SHFP	Folger Point	Salem Harbor	MA	13276	42°30.81'	70°50.65'
7	MBNB	Nahant Bay	Salem Harbor	MA	13272	42°25.19'	70°54.43'
8	BHDI	Deer Island	Boston Harbor	MA	13272	42°21.44'	70°58.38'
9	BHDB	Dorchester Bay	Boston Harbor	MA	13270	42°18.13'	70°02.18'
10	BHHB	Hingham Bay	Boston Harbor	MA	13270	42°16.56'	70°53.00'
11	BHBI	Brewster Island	Boston Harbor	MA	13270	42°20.59'	70°52.70'
12	MBNR	North River	Massachusett Bay	MA	13269	42°09.62'	70°44.55'
13	DBCI	Clarks Island	Duxbury Bay	MA	13253	42°00.82'	70°38.19'
14	CCNH	Nauset Harbor	Cape Cod	MA	13246	41°47.75'	69°56.77'
21	NBDI	Dyer Island	Narragansett Bay	RI	13223	41°36.29'	71°18.31'
22	NBPI	Patience Island	Narragansett Bay	RI	13224	41°39.14'	71°21.38'
23	NBDU	Dutch Island	Narragansett Bay	RI	13223	41°29.47'	71°24.01'
24	BIBI	Block Island	Block Island	RI	13217	41°11.82'	71°35.47'
38	HRJB	Jamaica Bay	Hud./Rar. Estuary	NY	12350	40°34.00'	73°53.72'
39	HRUB	Upper Bay	Hud./Rar. Estuary	NY	12334	40°41.36'	74°02.59'
40	HRLB	Lower Bay	Hud./Rar. Estuary	NY	12402	40°33.96'	74°03.05'
41	HRRB	Raritan Bay	Hud./Rar. Estuary	NJ	12331	40°31.14'	74°11.07'
42	NYSH	Sandy Hook	New York. Bight	NJ	12401	40°29.25'	74°02.00'
43	NYLB	Long Branch	New York. Bight	NJ	12324	40°17.69'	73°58.72'
44	NYSR	Shark River	New York. Bight	NJ	12324	40°11.22'	74°00.54'
47	DBCM	Cape May	Delaware Bay	NJ	12214	38°58.93'	74°57.68'
49	DBBD	Ben Davis Point	Delaware Bay	NJ	12304	39°15.14'	75°18.17'
54	DBCH	Cape Henlopen	Delaware Bay	MD	12216	38°47.01'	75°07.23'
55	CBBO	Bodkin Point	Chesapeake Bay	MD	12278	39°09.44'	76°24.29'
56	CBMP	Mountain Point	Chesapeake Bay	MD	12278	39°04.32'	76°24.76'
57	CBHP	Hackett Point	Chesapeake Bay	MD	12282	38°58.17'	76°24.88'
58	CBCP	Choptank River	Chesapeake Bay	MD	12266	38°36.44'	76°07.20'
59	CBHG	Hog Point	Chesapeake Bay	MD	12264	38°18.74'	76°23.87'
60	PRRP	Ragged Point	Potomac River	VA	12286	38°09.30'	76°36.05'
61	PRSP	Swan Point	Potomac River	MD	12286	38°16.90'	76°56.02'
62	PRMC	Mattox Creek	Potomac River	VA	12286	38°13.40'	76°57.69'
64	RRRR	Ross Rock	Rappahannock	VA	12237	37°54.12'	76°47.27'
65	CBCI	Chincoteague Inlet	Chincoteague Bay	VA	12211	37°56.31'	76°22.55'
66	QIUB	Upshur Bay	Quinby Inlet	VA	12210	37°31.50'	75°42.83'
67	CBCC	Cape Charles	Chesapeake Bay	VA	12224	37°17.07'	76°00.92'

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - EAST COAST

GERG #	Site Code	Site Name	Site Location	State	NOS Chart #	Deg. Min Latitude	Deg. Min Longitude
68	CBDP	Dandy Point	Chesapeake Bay	VA	12222	37°05.90'	76°17.69'
69	CBJR	James River	Chesapeake Bay	VA	12248	37°03.92'	76°37.93'
70	RSJC	John Creek	Roanoke Sound	VA	12204	35°53.39'	75°38.02'
71	PSCH	Cape Hatteras	Pamlico Sound	NC	11555	35°12.18'	75°42.96'
72	PSWB	Wysoching Bay	Pamlico Sound	NC	11548	35°24.74'	76°02.38'
73	PSPR	Pungo River	Pamlico Sound	NC	11553	35°17.76'	76°29.35'
74	PSNR	Neuse River	Pamlico Sound	NC	11553	35°05.34'	76°31.32'
76	CFBI	Battery Island	Cape Fear	NC	11537	33°54.95'	78°00.21'
78	SRNB	North Bay	Santee River	SC	11532	33°10.37'	79°14.56'
81	SRTI	Tybee Island	Savannah River	GA	11512	32°00.99'	80°57.97'
82	SSSI	Sapelo Island	Sapelo Sound	GA	11510	31°23.57'	81°17.28'
83	ARWI	Wolfe Island	Altamaha River	GA	11508	31°19.45'	81°18.65'
84	SJCB	Chicopit Bay	St. Johns River	FL	11491	30°22.86'	81°26.40'
85	MRCB	Cresent Beach	Matanzas River	FL	11485	29°45.84'	81°15.71'
86	IRSR	Sebastian River	Indian River	FL	11472	27°49.77'	80°28.46'
87	NMML	Maule Lake	North Miami	FL	11467	25°56.26'	80°08.98'
88	BBGC	Gould's Canal	Biscayne Bay	FL	11463	25°32.00'	80°19.39'

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - GULF COAST

GERG #	SITE CODE	SITE NAME &LOCATION	STATE	NOS CHART #	LAT. Deg. Min	LONG. Deg. Min
201	PRBB	BAHIA DE BOQUERON PUERTO RICO	PR	25671	18°00.44'	67°10.72'
202	PRBM	BAHIA MONTALVA PUERTO RICO	PR	25671	17°58.23'	66°59.43'
203	PRBJ	BAHIA DE JOBOS PUERTO RICO	PR	25677	17°56.33'	66°10.95'
204	BHKF	BAHIA HONDA KEY FLORIDA KEYS	FL	11445	24°39.52'	81°16.43'
205	FBJB	JOE BAY FLORIDA BAY	FL	11541	25°12.53'	80°32.00'
206	FBFO	FLAMINGO FLORIDA BAY	FL	11541	25°08.47'	80°55.43'
207	EVFU	FAKA UNION BAY EVERGLADES	FL	11430	25°54.16'	81°30.84'
208	RBHC	HENDERSON CREEK ROOKERY BAY	FL	11430	26°01.50'	81°44.20'
209	NBNB	NAPLES BAY NAPLES BAY	FL	11430	26°06.75'	81°47.13'
210	CBBI	BIRD ISLAND CHARLOTTE HARBOR	FL	11427	26°30.86	82°02.07'
211	CBFM	FORT MEYERS CHARLOTTE HARBOR	FL	11427	26°33.50'	81°55.37'
212	TBCB	COCKROACH BAY TAMPA BAY	FL	11414	27°40.55'	82°30.56'
213	TBHB	HILLSBOROUGH BAY TAMPA BAY	FL	11413	27°51.28'	82°23.75'
214	TBKA	KNIGHT AIRPORT TAMPA BAY	FL	11413	27°54.46'	82°27.29'
215	TBOT	OLD TAMPA BAY TAMPA BAY	FL	11413	28°01.48'	82°37.95'
216	TBPB	PAPYS BAYOU TAMPA BAY	FL	11413	27°50.53'	82°36.62'
217	TBMK	MULLET KEY BAYOU TAMPA BAY	FL	11411	27°37.28'	82°43.62'
218	TBNP	NAVAREZ PARK TAMPA BAY	FL	11411	27°47.28'	82°45.28'
219	CKBP	BLACK POINT CEDAR KEY	FL	11408	29°12.40'	83°04.17'
220	SRWP	WEST PASS SUWANEE RIVER	FL	11408	29°19.75'	83°10.45'
221	AESP	SPRING CREEK APALACHEE BAY	FL	11405	30°03.80'	84°19.32'
222	APCP	CAT POINT BAR APALACHICOLA BAY	FL	11404	29°43.45'	84°53.05'
223	APDB	DRY BAR APALACHICOLA BAY	FL	11402	29°40.35'	85°03.94'
224	SAWB	WATSON BAYOU ST. ANDREW BAY	FL	11390	30°08.55'	85°37.93'
225	PCMP	MUNICIPAL PIER PANAMA CITY	FL	11390	30°09.07'	85°39.78'
226	PCLO	LITTLE OYSTER BAY PANAMA CITY	FL	11390	30°15.08'	85°40.86'
227	CBSR	SANTA ROSA CHOCTAWATCHEE BAY	FL	11385	30°24.70'	86°12.28'
228	CBJB	JOES BAYOU CHOCTAWATCHEE BAY	FL	11385	30°24.62'	86°29.45'
229	CBPP	POSTIL POINT CHOCTAWATCHEE BAY	FL	11385	30°28.85'	86°28.73'
230	CBBB	BOGGY BAYOU CHOCTAWATCHEE BAY	FL	11385	30°30.08'	86°29.65'
231	CBBL	BEN'S LAKE CHOCTAWATCHEE BAY	FL	11385	30°27.15'	86°32.45'
232	PBSP	SABINE POINT PENSACOLA BAY	FL	11378	30°20.80'	87°09.10'
233	PBIB	INDIAN BAYOU PENSACOLA BAY	FL	11378	30°31.00'	87°06.70'
234	PBPH	PUBLIC HARBOR PENSACOLA BAY	FL	11378	30°24.63'	87°11.42'
235	MBDR	DOG RIVER MOBILE BAY	MS	11376	30°35.50'	88°02.72'
236	MBHI	HOLLINGERS ISLAND MOBILE BAY	MS	11376	30°33.80'	88°04.50'
237	MBCP	CEDAR POINT REEF MOBILE BAY	MS	11378	30°18.70'	88°08.00'
238	MSPB	PASCAGOULA BAY MISSISSIPPI SOUND	AL	11375	30°20.14'	88°35.17'
239	MSBB	BILOXI BAY MISSISSIPPI SOUND	AL	11372	30°23.55'	88°51.45'
240	MSPC	PASS CHRISTIAN MISSISSIPPI SOUND	AL	11372	30°18.12'	89°19.62

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - GULF COAST

GERG #	SITE CODE	SITE NAME &LOCATION	STATE	NOS CHART #	LAT. Deg. Min	LONG. Deg. Min
241	LPNO	NEW ORLEANS LAKE PONTCHARTRAIN	LA	11369	30°02.18'	90°02.48'
242	LBGO	GULF OUTLET LAKE BORGNE	LA	11371	29°56.5'	89°50.02'
243	LBMP	MALHEUREUX POINT LAKE BORGNE	LA	11364	29°52.02'	89°40.71'
244	BSBG	BAY GARDERNE BRETON SOUND	LA	11364	29°36.12'	89°37.65'
245	BSSI	SABLE ISLAND BRETON SOUND	LA	11364	29°24.26'	89°29.09'
246	MRPL	PASS A LOUTRE MISSISSIPPI RIVER	LA	11361	29°04.87'	89°05.53'
247	MRTP	TIGER PASS MISSISSIPPI RIVER	LA	11361	29°08.69'	89°25.67'
248	BBMB	MIDDLE BANK BARATARIA BAY	LA	11365	29°16.60'	89°56.52'
249	BBSD	BAYOU ST. DENIS BARATARIA BAY	LA	11365	29°24.29'	89°59.93'
250	BBTB	TURTLE BAY BARATARIA BAY	LA	11365	29°30.67'	90°05.00'
251	TBLF	LAKE FELICITY TERREBONE BAY	LA	11357	29°15.80'	90°24.40'
252	TBLB	LAKE BARRE TERREBONE BAY	LA	11357	29°15.60'	90°35.70'
253	CLCL	CAILLOU LAKE CAILLOU LAKE	LA	11356	29°15.19'	90°55.60'
254	ABOB	OYSTER BAYOU ATCHAFALAYA BAY	LA	11356	29°15.33'	91°08.17'
255	VBSP	SOUTHWEST PASS VERMILLION BAY	LA	11349	29°34.77'	92°03.06
256	JHJH	JOSEPH HARBOR BAYOU J. HARBOR	LA	11344	29°38.21'	92°46.01'
257	CLLC	LAKE CHARLES CALCASIEU LAKE	LA	11347	30°03.42'	93°18.42'
258	CLSJ	ST. JOHNS ISLAND CALCASIEU LAKE	LA	11347	29°49.76'	93°23.01'
259	SLBB	BLUE BUCK POINT SABINE LAKE	LA	11342	29°47.45'	93°54.38'
260	GBFR	FRENCHY'S REEF GALVESTON BAY	TX	11326	29°31.95'	94°36.00'
261	GBHR	HANNA'S REEF GALVESTON BAY	TX	11326	29°28.82'	94°44.51'
262	TBVT	VINGT-ET-UN REEF TRINITY BAY	TX	11326	29°33.06'	94°46.61'
263	TBTR	TRINITY REEF TRINITY BAY	TX	11326	29°41.25'	94°51.50'
264	TBDR	DOW REEF TRINITY BAY	TX	11326	29°38.80'	94°54.27'
265	GBSC	SHIP CHANNEL GALVESTON BAY	TX	11328	29°42.27'	94°59.58'
266	GBYC	YACHT CLUB GALVESTON BAY	TX	11326	29°37.32'	94°59.75'
267	GBRB	RED BLUFF REEF GALVESTON BAY	TX	11326	29°36.56'	94°58.67'
268	GBST	MARKER '63' REEF GALVESTON BAY	TX	11326	29°33.26'	94°54.93'
269	GBRF	RED FISH BAR GALVESTON BAY	TX	11326	29°29.84'	94°51.61'
270	GBTD	TODD'S DUMP GALVESTON BAY	TX	11326	29°30.18'	94°53.76'
271	GBDK	DICKINSON REEF GALVESTON BAY	TX	11326	29°27.68'	94°56.86'
272	GBDL	DOLLAR REEF GALVESTON BAY	TX	11326	29°26.52'	94°52.71'
273	GBOB	OFFATTS BAYOU GALVESTON BAY	TX	11324	29°17.04'	94°50.18'
274	GBCR	CONFEDERATE REEF GALVESTON BAY	TX	11324	29°15.80'	94°54.98'
275	WBCL	CARANCAHUA LAKE WEST BAY	TX	11322	29°14.78'	95°00.91'
276	WBCB	WEST BAY CHOCOLATE BAY	TX	11322	29°10.10'	95°07.96'
277	CBBS	BASTROP BAY CHRISTMAS BAY	TX	11322	29°05.37'	95°10.68'
278	CBAR	ARCADIA REEF CHRISTMAS BAY	TX	11322	29°01.79'	95°12.34'
279	CBDB	DRUM BAY CHRISTMAS BAY	TX	11322	29°01.66'	95°13.74'
280	BRFS	FREEPORT SURFSIDE BRAZOS RIVER	TX	11322	28°55.27'	95°20.37'

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - GULF COAST

GERG #	SITE CODE	SITE NAME &LOCATION	STATE	NOS CHART #	LAT. Deg. Min	LONG. Deg. Min
281	BRCL	CEDAR LAKE BRAZOS RIVER	TX	11322	28°51.48'	95°27.88'
282	CLCB	CEDAR LAKE BAYOU CEDAR LAKE	TX	11319	28°49.91'	95°32.58'
283	EMBI	BIRD ISLAND EAST MATAGORDA	TX	11319	28°43.77'	95°46.00'
284	MBEM	EAST MATAGORDA MATAGORDA BAY	TX	11319	28°42.67'	95°53.00'
285	EMMR	3 MILE REEF EAST MATAGORDA	TX	11319	28°38.00'	95°56.50'
286	MBDI	DOG ISLAND MATAGORDA BAY	TX	11319	28°38.42'	96°00.47'
287	MBMI	MAD ISLAND REEF MATAGORDA BAY	TX	11319	28°37.15'	96°05.63'
288	MBOL	OYSTER LAKE MATAGORDA BAY	TX	11317	28°36.83'	96°10.53'
289	MBTP	TRES PALACIOS BAY MATAGORDA BAY	TX	11317	28°38.98'	96°14.01'
290	MBCB	CARANCAHUA BAY MATAGORDA BAY	TX	11317	28°39.90'	96°22.98'
291	LBKB	KELLER BAY LAVACA BAY	TX	11317	28°35.81'	96°28.62'
292	MBLR	LAVACA R. MOUTH MATAGORDA BAY	TX	11317	28°39.62'	96°35.07'
293	MBGP	GALLINIPPER PT. MATAGORDA BAY	TX	11317	28°34.73'	96°33.78'
294	MBPL	POWDERHORN LAKE MATAGORDA BAY	TX	11317	28°30.50'	96°29.40'
295	ESBD	BILL DAYS REEF ESPIRITU SANTO	TX	11319	28°24.73'	96°27.04'
296	ESJR	JOSEPHINE REEF ESPIRITU SANTO	TX	11315	28°20.16'	96°32.33'
297	ESSP	SOUTH PASS REEF ESPIRITU SANTO	TX	11315	28°17.81'	96°37.33'
298	SAMP	MOSQUITO POINT SAN ANTONIO BAY	TX	11315	28°20.11'	96°42.49'
299	SAPP	PANTHER PT. REEF SAN ANTONIO BAY	TX	11315	28°14.00'	96°42.55'
300	SACF	CHICKEN FOOT REEF SAN ANTONIO BAY	TX	11315	28°16.26'	96°46.81'
301	MBAR	AYRES REEF MESQUITE BAY	TX	11315	28°10.38'	96°50.10'
302	ABLR	LONG REEF ARANSAS BAY	TX	11314	28°03.29'	96°57.07'
303	ABCB	ST. CHARLES BAY PASS ARANSAS BAY	TX	11314	28°07.92'	96°58.12'
304	CBLP	LAP REEF COPANO BAY	TX	11314	28°08.56'	97°02.87'
305	CBCR	COPANO REEF COPANO BAY	TX	11314	28°08.52'	97°07.68'
306	ABHI	HARBOR ISLAND ARANSAS BAY	TX	11314	27°50.33'	97°04.52'
307	CCEF	EAST FLATS REEF CORPUS CHRISTI	TX	11309	27°49.00'	97°07.50'
308	CCRB	REDFISH BAY CORPUS CHRISTI	TX	11309	27°51.68	97°09.90
309	CCSP	SHAMROCK POINT CORPUS CHRISTI	TX	11309	27°45.25'	97°11.00'
310	CCIC	INGLESIDE COVE CHORPUS CHRISTI	TX	11309	27°50.28'	97°14.28'
311	CCNB	NEUCES BAY CORPUS CHRISTI	TX	11309	27°51.13'	97°21.59'
312	CCBH	BOAT HARBOR CORPUS CHRISTI	TX	11309	27°50.17'	97°22.81'
313	NBOR	OYSTER REEFS NUECES BAY	TX	11309	27°50.33'	97°25.06'
314	CCTB	TULE TURNING BASIN CORPUS CHRISTI	TX	11311	27°49.33'	97°26.46'
315	LMTS	MARKER '27' LAGUNA MADRE	TX	11303	26°18.06'	97°17.86'
316	LMAC	ARROYO COLORADO LAGUNA MADRE	TX	11303	26°16.80'	97°17.30'
317	LMFN	MARKER '49' LAGUNA MADRE	TX	11303	26°16.09'	97°16.87'
318	LMSF	MARKER '75' LOWER LAGUNA MADRE	TX	11302	26°12.82'	97°16.02'
319	LMPI	PORT ISABEL LOWER LAGUNA MADRE	TX	11302	26°03.90'	97°12.52'
320	LMSB	SOUTH BAY LOWER LAGUNA MADRE	TX	11302	26°02.60'	97°10.57'

NOAA NS&T MUSSEL WATCH PROJECT - 1995 - FINAL POSITIONS - WEST COAST

GERG #	SITE CODE	SITE NAME & LOCATION	STATE	NOS CHART #	Deg. Min Latitude	Deg. Min Longitude
401	IBNJ	NORTH JETTY IMPERIAL BEACH	CA	18872	32°35.26'	117°08.01'
402	SDCB	CORONADO BRIDGE SAN DIEGO BAY	CA	18773	32°41.19'	117°09.55'
403	PLLH	LIGHTHOUSE POINT LOMA	CA	18773	32°40.83'	117°14.93'
404	SDHI	HARBOR ISLAND SAN DIEGO BAY	CA	18773	32°43.48'	117°11.68'
405	MBVB	VENTURA BRIDGE MISSION BAY	CA	18765	32°46.05'	117°14.52'
406	LJLJ	POINT LA JOLLA LA JOLLA	CA	18765	32°51.09'	117°16.43'
407	OSBJ	MUNICIPAL BEACH JETTY OCEANSIDE	CA	18774	33°12.10'	117°23.62'
410	ABWJ	WEST JETTY ANAHEIM BAY	CA	18749	33°44.00'	118°06.06'
413	PVRP	ROYAL PALMS STATE PARK PALOS VERDES	CA	18746	33°43.02'	118°19.37'
415	MDSJ	SOUTH JETTY MARINA DEL RAY	CA	18744	33°57.69'	118°27.50'
417	PDPD	POINT DUME POINT DUME	CA	18744	34°00.10'	118°48.52'
422	SLSL	POINT SAN LUIS SAN LUIS OBISPO BAY	CA	18704	35°09.63'	120°45.35'
424	PGLP	LOVERS POINT PACIFIC GROVE	CA	18685	36°37.63'	121°54.99'
425	MBML	MOSS LANDING MONTEREY BAY	CA	18685	36°48.07'	121°47.38'
426	MBES	ELKHORN SLOUGH MONTEREY BAY	CA	18685	36°48.59'	121°47.11'
427	MBSC	POINT SANTA CRUZ MONTEREY BAY	CA	18685	36°57.25'	122°01.48'
428	SFDB	DUMBARTON BRIDGE SAN FRANCISCO	CA	18651	37°30.16'	122°07.28'
429	SFSM	SAN MATEO BRIDGE SAN FRANCISCO	CA	18651	37°34.68'	122°15.22'
431	SFEM	EMERYVILLE SAN FRANCISCO	CA	18652	37°49.23'	122°19.80'
433	TBSR	SPENGER'S RESIDENCE TOMALES BAY	CA	18643	38°08.97'	122°54.24'
435	BBBE	BODEGA BAY ENTRANCE BODEGA BAY	CA	18643	38°18.30'	123°03.96'
436	PALH	LIGHTHOUSE POINT ARENA	CA	18640	38°57.18'	123°44.58'
437	PDSC	SHELTER COVE POINT DELGADA	CA	18620	40°01.35'	124°04.40'
438	HMBJ	HUMBOLDT BAY JETTY EUREKA	CA	18622	40°45.85'	124°14.02'
439	EUSB	SAMOA BRIDGE EUREKA	CA	18622	40°49.29'	124°10.28'
441	SGSG	POINT ST. GEORGE CRESCENT CITY	CA	18603	41°44.87'	124°12.46'
443	CBRP	RUSSELL POINT COOS BAY	OR	18587	43°25.59'	124°13.17'
444	YBOP	ONEATTA POINT YAQUINA BAY	OR	18561	44°34.51'	123°59.34'
446	YHFC	FOGARTY CREEK YAQUINA BAY	OR	18520	44°50.22'	124°03.12'
447	TBHP	HOBSONVILLE POINT TILLAMOOK BAY	OR	18558	45°32.83'	123°54.45'
449	CRSJ	SOUTH JETTY COLUMBIA RIVER	OR	18521	46°13.72'	124°01.39'
452	GHWJ	WESTPORT JETTY GRAY'S HARBOR	WA	18502	46°54.70'	124°07.03'
457	PSHC	HOOD CANAL PUGET SOUND	WA	18441	47°49.91'	122°41.31'
458	SSBI	BUDD INLET SOUTH PUGET SOUND	WA	18456	47°05.96'	122°53.65'
465	WIPP	POSSESSION POINT WHIDBEY ISLAND	WA	18473	47°54.27'	122°22.59'
467	BBSM	SQUALICUM MARINA BELLINGHAM BAY	WA	18424	48°45.13'	122°29.87'
469	KTMP	MOUNTAIN POINT KETCHIKAN	AK	17428	55°17.63'	131°32.88'
470	NBES	EAST SIDE NAHKU BAY	AK	17317	59°27.20'	135°20.19'
471	PWSH	SHEEP BAY PRINCE WILLIAM SOUND	AK	16709	60°38.44'	145°59.41'
472	PWKH	KNOWLES HEAD - PWS	AK	16708	60°41.27'	146°34.57'
473	PVMC	MINERAL CREEK FLATS PORT VALDEZ	AK	16707	61°07.97'	146°27.66'
474	UISB	SIWASH BAY UNAKWIK INLET	AK	16700	60°57.65'	147°38.76'
475	PWDI	DISK ISLAND - PWS	AK	16705	60°29.58'	147°39.35'
476	GASL	SLEEPY BAY GULF OF ALASKA	AK	16702	60°04.04'	147°49.53'
477	GAWB	WINDY BAY GULF OF ALASKA	AK	16645	59°13.12'	151°31.02'
478	CIHS	HOMER SPIT COOK INLET	AK	16645	59°36.87'	151°26.65'
479	GASH	SHUYAK HARBOR GULF OF ALASKA	AK	16605	58°30.06'	152°37.31'

Appendix C

Yearly Sampling Schedule

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg #	NS&T Code	Name	Location	ST.	Date	Sampling Year 86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
1	PBPI	Pickering Island	Penobscot Bay	ME	3/29	x	x	x	x	x	x	x	x		x		x		x		x
2	PBSI	Sears Island	Penobscot Bay	ME	3/28	x	x	x	x	x	x	x	x	x	x		x		x		x
3	MSSP	Stover Point	Merriconeag Sound	ME	3/30			x	x	x	x	x	x	x	x		x		x		x
4	CAKP	Kennebunkport	Cape Arundel	ME	3/31				x	x	x	x	x		x		x		x		x
5	CAGH	Gap Head	Cape Ann	MA	3/16		x	x	x	x	x	x	x	x	x		x		x		x
6	SHFP	Folger Point	Salem Harbor	MA	3/20			x	x	x	x	x	x		x		x		x		x
7	MBNB	Nahant Bay	Massachusetts Bay	MA	3/9					x			x	x	x		x		x		x
8	BHDI	Deer Island	Boston Harbor	MA	3/5	x	x	x	x	x	x	x	x		x		x		x		
9	BHDB	Dorchester Bay	Boston Harbor	MA	3/7	x	x	x	x	x			x	x	x		x		x		x
10	BHHB	Hingham Bay	Boston Harbor	MA	3/7	x	x	x	x	x	x	x	x		x		x		x		x
11	BHBI	Brewster Island	Boston Harbor	MA	3/19	x	x	x	x	x	x	x	x	x	x		x		x		x
12	MBNR	North River	Massachusetts Bay	MA	3/11					x			x		x		x		x		x
13	DBCI	Clarks Island	Duxbury Bay	MA	3/12				x	x	x	x	x	x	x		x		x		x
14	CCNH	Nauset Harbor	Cape Cod	MA	3/11				x	x	x	x	x		x		x		x		x
15	BBCC	Cape Cod Canal	Buzzards Bay	MA	3/15				x	x	x	x		x		x		x		x	
16	BBWF	West Falmouth	Buzzards Bay	MA	3/24					x	x	x		x		x		x		x	
17	BBNI	Naushon Island	Buzzards Bay	MA	3/24					x	x	x		x		x		x		x	
18	BBAR	Angelica Rock	Buzzards Bay	MA	3/21	x	x	x	x	x	x	x	x	x		x		x		x	
19	BBRH	Round Hill	Buzzards Bay	MA	3/22	x	x	x	x	x				x		x		x		x	
20	BBGN	Goosebury Neck	Buzzards Bay	MA	3/16	x	x	x	x	x	x	x	x	x		x		x		x	
21	NBDI	Dyer Island	Narragansett Bay	RI	3/27	x	x	x	x	x			x	x	x		x		x		x
22	NBPI	Patience Island	Narragansett Bay	RI	3/25				x	x	x	x	x		x		x		x		x
23	NBDU	Dutch Island	Narragansett Bay	RI	3/25	x	x		x		x	x	x	x	x		x		x		x
24	BIBI	Block Island	Block Island	RI	3/26		x	x	x	x	x	x	x		x		x		x		x
25	LICR	Connecticut River	Long Island Sound	CT	11/27	x	x	x	x	x	x	x		x		x		x		x	
26	LINH	New Haven	Long Island Sound	CT	11/28	x	x	x	x	x	x	x	x	x		x		x		x	
27	LIHR	Housatonic River	Long Island Sound	CT	11/29	x	x	x	x	x	x	x		x		x		x		x	
28	LISI	Sheffield Island	Long Island Sound	CT	11/30	x	x	x	x	x			x	x		x		x		x	
29	LIGB	Gardiners Bay	Long Island	NY	12/19				x	x	x	x	x			x		x		x	
30	MBTH	Tuthill Point	Moriches Bay	NY	12/2	x	x	x	x	x	x	x	x	x		x		x		x	
31	LIFI	Fire Island	Long Island	NY	12/2					x						x		x		x	
32	LIPJ	Port Jefferson	Long Island Sound	NY	12/1	x	x	x	x	x	x	x	x	x		x		x		x	
33	LIHU	Huntington Hbr.	Long Island Sound	NY	12/1	x	x	x	x	x	x	x		x		x		x		x	
34	LIJI	Jones Inlet	Long Island	NY	12/2					x			x	x		x		x		x	
35	LIHH	Hempstead Hbr.	Long Island Sound	NY	11/30	x	x	x	x	x	x	x	x	x		x		x		x	
36	LIMR	Mamaroneck R.	Long Island Sound	NY	11/28	x	x	x	x	x	x	x		x		x		x		x	
37	LITN	Throgs Neck	Long Island Sound	NY	11/29	x	x	x	x	x	x	x	x	x		x		x		x	
38	HRJB	Jamaica Bay	Hud./Rar. Estuary	NY	12/3	x	x	x	x	x	x	x	x		x		x		x		x
39	HRUB	Upper Bay	Hud./Rar. Estuary	NY	12/6	x	x	x	x	x	x	x		x	x		x		x		x
40	HRLB	Lower Bay	Hud./Rar. Estuary	NY	12/8	x	x	x	x	x			x		x		x		x		x
41	HRRB	Raritan Bay	Hud./Rar. Estuary	NJ	12/9					x				x	x		x		x		x
42	NYSH	Sandy Hook	New York. Bight	NJ	12/8	x	x	x	x	x	x	x			x		x		x		x
43	NYLB	Long Branch	New York. Bight	NJ	12/6	x	x	x	x	x			x	x	x		x		x		x
44	NYSR	Shark River	New York. Bight	NJ	12/6	x	x	x	x	x	x	x	x	x	x		x		x		x
45	BIBL	Barnegat Light	Barnegat Inlet	NJ	12/8			x	x	x	x	x		x		x		x		x	
46	AIAC	Atlantic City	Absecon Inlet	NJ	12/8			x	x	x	x	x		x		x		x		x	
47	DBCM	Cape May	Delaware Bay	NJ	12/9				x	x	x	x	x		x	x		x		x	
48	DBFE	False Egg Island	Delaware Bay	NJ	12/11	x	x	x		x	x	x		x		x		x		x	
49	DBBD	Ben Davis Point	Delaware Bay	NJ	12/12	x	x	x	x	x			x		x	x		x		x	

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg #	NS&T Code	Name	Location	ST.	Date	Sampling Year 86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
50	DBAP	Arnolds Point	Delaware Bay	DE	12/14	x	x	x		x	x	x		x		x		x		x	
51	DBHC	Hope Creek	Delaware Bay	NJ	12/14				x												
52	DBWB	Woodland Beach	Delaware Bay	DE	12/15				x												
53	DBKI	Kelly Island	Delaware Bay	DE	12/15	x	x	x	x	x	x	x		x		x		x		x	
54	DBCH	Cape Henlopen	Delaware Bay	MD	12/10				x	x	x	x	x		x	x		x		x	
55	CBBO	Bodkin Point	Chesapeake Bay	MD	1/7				x	x			x		x		x		x		x
56	CBMP	Mountain Point	Chesapeake Bay	MD	1/7	x	x	x	x	x	x	x	x		x		x		x		x
57	CBHP	Hackett Point	Chesapeake Bay	MD	1/9	x	x	x	x	x	x	x		x	x		x		x		x
58	CBCP	Choptank River	Chesapeake Bay	MD	1/5				x	x	x	x	x		x		x		x		x
59	CBHG	Hog Point	Chesapeake Bay	MD	1/11	x	x	x	x	x	x	x		x	x		x		x		x
60	PRRP	Ragged Point	Potomac River	VA	1/16				x	x	x	x	x		x		x		x		x
61	PRSP	Swan Point	Potomac River	MD	1/14				x	x				x	x		x		x		x
62	PRMC	Mattox Creek	Potomac River	VA	1/14					x				x	x		x		x		x
63	CBIB	Ingram Bay	Chesapeake Bay	VA	1/16	x	x														
64	RRRR	Ross Rock	Rappahannock	VA	1/17				x	x	x	x	x		x		x		x		x
65	CBCI	Chincoteague Inlet	Chincoteague Bay	VA	12/17	x	x	x	x	x	x	x	x		x	x		x		x	
66	QIUB	Upshur Bay	Quinby Inlet	VA	12/18	x	x	x	x	x	x	x		x		x		x		x	
67	CBCC	Cape Charles	Chesapeake Bay	VA	12/17	x	x	x	x	x	x	x		x	x		x		x		x
68	CBDP	Dandy Point	Chesapeake Bay	VA	1/20	x	x	x	x	x	x	x	x		x		x		x		x
69	CBJR	James River	Chesapeake Bay	VA	1/22				x	x				x	x		x		x		x
70	RSJC	John Creek	Roanoke Sound	VA	1/26	x	x	x	x	x	x	x		x	x		x		x		x
71	PSCH	Cape Hatteras	Pamlico Sound	NC	1/28					x	x	x	x		x	x		x		x	
72	PSWB	Wysoching Bay	Pamlico Sound	NC	1/30	x	x	x	x	x	x	x	x		x		x		x		x
73	PSPR	Pungo River	Pamlico Sound	NC	1/31				x	x	x	x	x		x		x		x		x
74	PSNR	Neuse River	Pamlico Sound	NC	2/1				x	x	x	x	x		x		x		x		x
75	BIPI	Pivers Island	Beaufort Inlet	NC	2/2					x	x	x	x	x		x		x		x	
76	CFBI	Battery Island	Cape Fear	NC	2/3	x	x	x	x	x	x	x	x	x		x		x		x	
77	WBLB	Lower Bay	Winyah Bay	SC	2/6				x	x	x	x	x	x		x		x		x	
78	SRNB	North Bay	Santee River	SC	2/5				x	x	x	x	x		x	x		x		x	
79	CHFJ	Fort Johnson	Charleston Harbor	SC	2/8	x	x	x	x	x	x	x	x	x		x		x		x	
80	CHSF	Shutes Folly	Charleston Harbor	SC	2/7	x	x	x	x	x	x	x		x		x		x		x	
81	SRTI	Tybee Island	Savannah River	GA	2/9	x	x	x	x	x	x	x	x		x		x		x		x
82	SSSI	Sapelo Island	Sapelo Sound	GA	2/11	x	x	x	x	x	x	x		x	x		x		x		x
83	ARWI	Wolfe Island	Altamaha River	GA	2/12				x	x	x	x	x		x		x		x		x
84	SJCB	Chicopit Bay	St. Johns River	FL	2/13	x	x	x	x	x	x	x	x		x		x		x		x
85	MRCB	Cresent Beach	Matanzas River	FL	2/18	x	x	x	x	x	x	x		x	x		x		x		x
86	IRSR	Sebastian River	Indian River	FL	2/18			x	x	x	x	x	x		x		x		x		x
87	NMML	Maule Lake	North Miami	FL	2/21			x	x	x	x	x		x	x		x		x		x
88	BBGC	Gould's Canal	Biscayne Bay	FL	2/24					x	x	x	x		x		x		x		x
89	BBPC	Princeton Canal	Biscayne Bay	FL	2/20	x	x														

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg	NS&T					Sampling Year															
#	Code	Name	Location	ST.	Date	86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
201	PRBB	Bahia de Boqueron	Puerto Rico	PR	2/11							x	x	x							
202	PRBM	Bahia Montalva	Puerto Rico	PR	2/13							x	x	x							
203	PRBJ	Bahia de Jobos	Puerto Rico	PR	2/14							x	x	x							
204	BHKF	Bahia Honda Key	Florida Keys	FL	1/22						x	x		x		x		x		x	
205	FBJB	Joe Bay	Florida Bay	FL	1/25									x	x	x		x		x	
206	FBFO	Flamingo	Florida Bay	FL	1/25									x	x	x		x		x	
207	EVFU	Faka Union Bay	Everglades	FL	1/30	x	x	x	x	x	x	x	x		x	x		x		x	
208	RBHC	Henderson Creek	Rookery Bay	FL	1/29	x	x	x	x	x	x	x	x	x		x		x		x	
209	NBNB	Naples Bay	Naples Bay	FL	1/29	x	x	x	x	x	x	x	x		x	x		x		x	
210	CBBI	Bird Island	Charlotte Harbor	FL	1/31	x	x	x	x	x	x	x	x	x	x		x		x		x
211	CBFM	Fort Meyers	Charlotte Harbor	FL	1/31			x	x	x	x	x	x		x		x		x		x
212	TBCB	Cockroach Bay	Tampa Bay	FL	2/1	x	x	x	x	x	x	x	x			x		x		x	
213	TBHB	Hillsborough	Tampa Bay	FL	1/31	x	x	x					x	x		x		x		x	
214	TBKA	Knight Airport	Tampa Bay	FL	1/31				x	x	x	x	x	x		x		x		x	
215	TBOT	Old Tampa Bay	Tampa Bay	FL	1/30			x	x	x	x	x	x	x		x		x		x	
216	TBPB	Papys Bayou	Tampa Bay	FL	1/31	x	x	x	x	x	x	x	x	x		x		x		x	
217	TBMK	Mullet Key Bay	Tampa Bay	FL	1/31	x	x	x	x	x	x	x	x	x		x		x		x	
218	TBNP	Navarez Park	Tampa Bay	FL	2/1				x	x	x	x	x	x		x		x		x	
219	CKBP	Black Point	Cedar Key	FL	1/29	x	x	x	x	x	x	x	x	x	x		x		x		x
220	SRWP	West Pass	Suwanee River	FL	1/29			x													
221	AESP	Spring Creek	Apalachee Bay	FL	1/29				x	x	x	x	x	x	x		x		x		x
222	APCP	Cat Point Bar	Apalachicola Bay	FL	1/28	x	x	x	x	x	x	x	x		x		x		x		x
223	APDB	Dry Bar	Apalachicola Bay	FL	1/27	x	x	x	x	x	x	x	x		x		x		x		x
224	SAWB	Watson Bayou	St. Andrew Bay	FL	1/28	x	x	x	x	x	x	x	x		x		x		x		x
225	PCMP	Municipal Pier	Panama City	FL	1/27			x	x	x			x		x		x		x		x
226	PCLO	Little Oyster Lake	Panama City	FL	1/28				x	x	x	x	x	x	x		x		x		x
227	CBSR	Off Santa Rosa	Choctawatchee Bay	FL	1/27	x	x	x	x	x	x	x	x		x	x		x		x	
228	CBJB	Joe's Bayou	Choctawatchee Bay	FL	1/27				x	x	x	x	x	x		x		x		x	
229	CBPP	Postil Point	Choctawatchee Bay	FL	1/23	x	x	x	x	x	x	x	x	x		x		x		x	
230	CBBB	Boggy Bayou	Choctawatchee Bay	FL	1/23							x		x							
231	CBBL	Ben's Lake	Choctawatchee Bay	FL	1/23							x		x							
232	PBSP	Sabine Point	Pensacola Bay	FL	1/26					x			x			x		x		x	
233	PBIB	Indian Bayou	Pensacola Bay	FL	1/26	x	x	x	x		x	x	x	x		x		x		x	
234	PBPH	Public Harbor	Pensacola Bay	FL	1/26			x	x	x	x	x	x	x		x		x		x	
235	MBDR	Dog River	Mobile Bay	AL	1/10					x						x		x		x	
236	MBHI	Hollingers Island	Mobile Bay	AL	1/10			x	x	x	x	x	x	x		x		x		x	
237	MBCP	Cedar Point	Mobile Bay	AL	1/9	x	x	x	x	x	x	x	x	x		x		x		x	
238	MSPB	Pascagoula Bay	Mississippi Sound	MS	1/12	x	x	x	x	x	x	x	x	x		x		x		x	
239	MSBB	Biloxi Bay	Mississippi Sound	MS	1/11	x	x	x	x	x	x	x	x		x	x		x		x	
240	MSPC	Pass Christian	Mississippi Sound	MS	1/10	x	x	x	x	x	x	x	x	x		x		x		x	
241	LPNO	New Orleans	Lake Pontchartrain	LA	1/9						x				x	x		x		x	
242	LBGO	Gulf Outlet	Lake Borgne	LA	1/25			x						x		x		x		x	
243	LBMP	Malheureux Point	Lake Borgne	LA	1/8	x	x	x	x	x	x	x	x	x		x		x		x	
244	BSBG	Bay Garderne	Breton Sound	LA	1/8	x	x	x	x	x	x	x	x		x	x		x		x	
245	BSSI	Sable Island	Breton Sound	LA	1/9	x	x	x	x	x	x	x	x	x		x		x		x	
246	MRPL	Pass a Loutre	Mississippi River	LA	1/9			x	x	x	x	x	x	x		x		x		x	
247	MRTP	Tiger Pass	Mississippi River	LA	1/8			x	x	x			x		x	x		x		x	
248	BBMB	Middle Bank	Barataria Bay	LA	1/7	x	x	x	x	x	x	x	x		x		x		x		x
249	BBSD	Bayou Saint Denis	Barataria Bay	LA	1/6	x	x	x	x	x		x	x		x		x		x		x

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg #	NS&T Code	Name	Location	ST.	Date	Sampling Year 86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
250	BBTB	Turtle Bay	Barataria Bay	LA	1/6			x			x				x		x		x		x
251	TBLF	Lake Felicity	Terrebonne Bay	LA	1/7	x	x	x	x	x	x	x	x	x		x		x		x	
252	TBLB	Lake Barre	Terrebonne Bay	LA	1/6	x	x	x	x	x	x	x	x			x		x		x	
253	CLCL	Caillou Lake	Caillou Lake	LA	1/7	x	x	x	x	x	x	x	x	x	x		x		x		x
254	ABOB	Oyster Bayou	Atchafalaya Bay	LA	1/8	x	x	x	x	x	x	x	x		x		x		x		x
255	VBSP	Southwest Pass	Vermillion Bay	LA	1/8	x	x	x	x	x	x	x	x	x	x		x		x		x
256	JHJH	J. Harbor Bayou	Joseph Harbor	LA	1/6	x	x	x	x	x	x	x	x		x		x		x		x
257	CLLC	Lake Charles	Calcasieu Lake	LA	1/7			x	x	x	x	x	x	x		x		x		x	
258	CLSJ	St. Johns Island	Calcasieu Lake	LA	1/7	x	x	x	x	x	x	x	x		x	x		x		x	
259	SLBB	Blue Buck Point	Sabine Lake	LA	1/6	x	x	x	x	x	x	x	x	x	x		x		x		x
261	GBHR	Hanna Reef	Galveston Bay	TX	12/6	x	x	x	x	x	x	x	x		x		x		x		x
265	GBSC	Ship Channel	Galveston Bay	TX	12/5			x	x	x	x	x	x	x	x		x		x		x
266	GBYC	Yacht Club	Galveston Bay	TX	12/5	x	x	x	x	x	x	x	x		x		x		x		x
270	GBTD	Todd's Dump	Galveston Bay	TX	12/6	x	x	x	x	x	x	x	x	x	x		x		x		x
273	GBOB	Offats Bayou	Galveston Bay	TX	12/5			x	x	x	x	x	x	x	x		x		x		x
274	GBCR	Confederate Reef	Galveston Bay	TX	12/5	x	x	x	x	x	x	x	x		x		x		x		x
280	BRFS	Freeport-Surfside	Brazos River	TX	12/4			x	x	x	x	x	x		x		x		x		x
281	BRCL	Cedar Lakes	Brazos River	TX	12/4				x	x	x	x	x	x	x		x		x		x
284	MBEM	East Matagorda	Matagorda Bay	TX	12/14	x	x	x	x	x	x	x	x		x		x		x		x
286	MBDI	Dog Island Reef	Matagorda Bay	TX	12/14			x													
289	MBTP	Tres Palacios	Matagorda Bay	TX	12/14	x	x	x	x	x	x	x	x		x		x		x		x
290	MBCB	Carancahua Bay	Matagorda Bay	TX	12/16			x		x			x	x	x		x		x		x
292	MBLR	Lavaca R. Mouth	Matagorda Bay	TX	12/15	x	x		x	x	x	x	x		x		x		x		x
293	MBGP	Gallinipper Point	Matagorda Bay	TX	12/15	x	x	x	x		x	x	x	x	x		x		x		x
295	ESBD	Bill Day's Reef	Espiritu Santo Bay	TX	12/15			x	x	x		x	x	x		x		x		x	
297	ESSP	South Pass Reef	Espiritu Santo Bay	TX	12/15	x	x			x	x	x		x		x		x		x	
298	SAMP	Mosquito Point	San Antonio Bay	TX	12/15	x	x		x		x	x			x	x		x		x	
299	SAPP	Panther Pt. Reef	San Antonio Bay	TX	12/15	x	x			x	x	x	x	x		x		x		x	
301	MBAR	Ayres Reef	Mesquite Bay	TX	12/15	x	x	x	x	x	x	x	x	x	x		x		x		x
302	ABLR	Long Reef	Aransas Bay	TX	12/15	x	x	x	x	x	x	x	x	x	x		x		x		x
305	CBCR	Copano Reef	Copano Bay	TX	12/13	x	x	x	x	x	x	x			x		x		x		x
306	ABHI	Harbor Island	Aransas Bay	TX	12/13			x													
310	CCIC	Ingleside Cove	Corpus Christi Bay	TX	12/13	x		x	x	x	x	x			x		x		x		x
311	CCNB	Nueces Bay	Corpus Christi Bay	TX	12/13	x	x	x	x	x		x	x	x	x		x		x		x
312	CCBH	Boat Harbor	Corpus Christi Bay	TX	12/16			x		x					x		x		x		x
316	LMAC	Arroyo Colorado	Laguna Madre	TX	12/14					x		x		x		x		x		x	
319	LMPI	Port Isabel	Laguna Madre	TX	12/13			x				x		x		x		x		x	
320	LMSB	South Bay	Laguna Madre	TX	12/13	x	x	x	x	x	x	x	x	x		x		x		x	

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg #	NS&T Code	Name	Location	ST.	Date	Sampling Year 86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
401	IBNJ	North Jetty	Imperial Beach	CA	12/10	x	x	x	x	x	x	x	x		x		x		x		x
402	SDCB	Coronada Bridge	San Diego Bay	CA	12/12				x	x	x	x	x	x	x		x		x		x
403	PLLH	Lighthouse	Point Loma	CA	1/26	x	x	x	x	x	x	x			x		x		x		x
404	SDHI	Harbor Island	San Diego Bay	CA	12/9	x	x	x	x	x	x	x	x		x		x		x		x
405	MBVB	Ventura Bridge	Mission Bay	CA	12/11	x	x	x	x	x	x	x	x		x		x		x		x
406	LJLJ	Point La Jolla	La Jolla	CA	1/28	x	x	x	x	x	x	x		x	x		x		x		x
407	OSBJ	Beach Jetty	Oceanside	CA	1/27	x	x	x	x	x	x	x	x		x		x		x		x
408	NBWJ	West Jetty	Newport Beach	CA	1/25	x	x	x	x	x	x	x		x		x		x		x	
409	SCBR	Bird Rock	Santa Catalina Is.	CA	3/9	x	x	x		x	x	x		x		x		x		x	
410	ABWJ	West Jetty	Anaheim Bay	CA	12/8	x	x	x	x	x	x	x	x		x	x		x		x	
411	LBBW	Breakwater	Long Beach	CA	3/7					x	x	x	x	x		x		x		x	
412	SPFP	Fishing Pier	San Pedro Harbor	CA	12/13	x	x	x	x	x	x	x		x		x		x		x	
413	PVRP	Royal Palms Park	Palos Verdes	CA	12/3	x	x	x	x	x	x	x	x		x	x		x		x	
414	RBMJ	Municipal Jetty	Redondo Beach	CA	3/6					x	x	x	x	x		x		x		x	
415	MDSJ	South Jetty	Marina Del Rey	CA	12/2	x	x	x	x	x	x	x	x		x	x		x		x	
416	TBSM	Santa Monica Bay	Las Tunas Beach	CA	3/5					x	x	x	x	x		x		x		x	
417	PDPD	Point Dume	Pt. Dume	CA	12/1	x	x	x	x	x	x	x	x		x	x		x		x	
418	SBSB	Pt. Santa Barbara	Pt. Santa Barbara	CA	11/29	x	x	x	x	x	x	x	x	x		x		x		x	
419	SCFP	Fraser Point	Santa Cruz Island	CA	2/22	x	x	x		x	x	x		x		x		x		x	
420	SANM	Tyler Bight	San Miguel Island	CA	3/14			x													
421	PCPC	Point Conception	Pt. Conception	CA	2/23	x	x	x	x	x	x	x		x		x		x		x	
422	SLSL	Point San Luis	San Luis Obispo	CA	11/30	x	x	x	x	x	x	x	x		x	x		x		x	
423	SSSS	San Simeon Point	San Simeon Point	CA	2/25	x	x	x	x	x	x	x		x		x		x		x	
424	PGLP	Lovers Point	Pacific Grove	CA	2/25	x	x	x	x	x	x	x	x		x		x		x		x
425	MBML	Moss Landing	Monterey Bay	CA	2/10					x	x	x	x	x	x		x		x		x
426	MBES	Elkhorn Slough	Monterey Bay	CA	2/11									x	x		x		x		x
427	MBSC	Pt. Santa Cruz	Monterey Bay	CA	2/26	x	x	x	x	x	x	x	x		x		x		x		x
428	SFDB	Dumbarton Bridge	San Fransisco Bay	CA	2/4	x	x	x	x	x	x	x	x		x		x		x		x
429	SFSM	San Mateo Bridge	San Fransisco Bay	CA	2/5	x	x	x	x	x	x	x		x	x		x		x		x
430	FIEL	East Landing	Farallon Island	CA	1/15			x													
431	SFEM	Emeryville	San Fransisco Bay	CA	2/8		x	x	x	x	x	x	x		x		x		x		x
432	SPSM	Semple Point	East San Pablo	CA																	
433	TBSR	Spenger's Res.	Tomales Bay	CA	2/9	x	x	x	x	x	x	x		x	x		x		x		x
434	SPSP	Point San Pedro	San Pablo Bay	CA																	
435	BBBE	Bodega Bay Ent.	Bodega Bay	CA	1/8	x	x	x	x	x	x	x	x		x		x		x		x
436	PALH	Arena Lighthouse	Point Arena	CA	1/9	x	x	x	x	x	x	x		x	x		x		x		x
437	PDSC	Shelter Cove	Point Delgada	CA	1/10	x	x	x	x	x	x	x	x		x		x		x		x
438	HMBJ	Humboldt Jetty	Eureka	CA	1/11	x	x	x	x	x	x	x	x		x		x		x		x
439	EUSB	Samoa Bridge	Eureka	CA	1/15					x	x	x		x	x		x		x		x
440	KRFR	Flint Rock Harbor	Klamath River	CA	1/8				x												
441	SGSG	Point St. George	Point St. George	OR	1/13	x	x	x	x	x	x	x	x		x		x		x		x
442	CBCH	Coos Head	Coos Bay	OR	12/12	x	x	x	x	x	x	x	x	x		x		x		x	
443	CBRP	Russell Point	Coos Bay	OR	12/12	x	x	x	x	x	x	x	x		x	x		x		x	
444	YBOP	Oneata Point	Yaquina Bay	OR	12/12	x	x	x	x	x	x	x	x	x	x		x		x		x
445	YHSS	Sally's Slough	Yaquina Bay	OR																	
446	YHFC	Fogarty Creek	Yaquina Head	OR	12/12	x	x	x	x	x	x	x	x		x		x		x		x
447	TBHP	Hobsonville Point	Tillamook Bay	OR	12/11	x	x	x	x	x	x	x	x	x	x		x		x		x
448	CRYB	Youngs Bay	Columbia River	OR																	
449	CRSJ	South Jetty	Columbia River	OR	2/15	x	x	x	x	x	x	x	x		x		x		x		x

NOAA NS&T MUSSEL WATCH PROJECT - YEARLY SAMPLING SCHEDULE

Gerg #	NS&T Code	Name	Location	ST.	Date	86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1
450	CRNJ	North Jetty	Columbia River	WA	2/5				x	x											
451	WBNA	Nahcotta	Willapa Bay	WA	2/6					x	x	x	x	x		x		x		x	
452	GHWJ	Westport Jetty	Gray's Harbor	WA	2/21	x	x	x	x	x	x	x	x		x	x		x		x	
453	JFCF	Cape Flattery	Str. Juan de Fuca	WA	3/3	x	x	x		x	x	x	x	x		x		x		x	
454	JFNB	Neah Bay	Str. Juan de Fuca	WA																	
455	PSPA	Port Angeles	Puget Sound	WA	1/8				x	x	x	x	x	x		x		x		x	
456	PSPT	Port Townsend	Puget Sound	WA	1/8					x	x	x	x	x		x		x		x	
457	PSHC	Hood Canal	Puget Sound	WA	1/8				x	x	x	x	x		x	x		x		x	
458	SSBI	Budd Inlet	South Puget Sound	WA	1/5	x	x	x	x	x	x	x	x		x	x		x		x	
459	CBBP	Brown's Point	Commencement B.	WA																	
460	CBTP	Tahlequah Point	Commencement B.	WA	12/11	x	x	x	x	x	x	x	x	x		x		x		x	
461	PSSS	South Seattle	Puget Sound	WA	12/11				x	x	x	x	x	x		x		x		x	
462	SIWP	Waterman Point	Sinclair Inlet	WA	12/11	x	x	x	x	x	x	x	x	x		x		x		x	
463	EBDH	Duwamish Head	Elliott Bay	WA	1/9					x				x		x		x		x	
464	EBFR	Four-Mile Rock	Elliott Bay	WA	12/11	x	x	x	x	x	x	x	x	x		x		x		x	
465	WIPP	Possession Point	Whidbey Island	WA	12/11	x	x	x	x	x	x	x	x		x	x		x		x	
466	PSEH	Everett Harbor	Puget Sound	WA	1/9				x	x				x		x		x		x	
467	BBSM	Squalicum Mar.	Bellingham Bay	WA	1/9	x	x	x	x	x	x	x	x		x	x		x		x	
468	PRPR	Point Robert	Point Roberts	WA	1/10	x	x	x	x	x	x	x	x	x		x		x		x	
469	KTMP	Mountain Point	Ketchikan	AK											x						
470	NBES	East Side	Nahku Bay	AK											x						
471	PWSH	Sheep Bay	Pr. William Snd.	AK											x						
472	PWKA	Knowles Head	PWS	AK											x						
473	PVMC	Mineral Cr. Flats	Port Valdez	AK	3/27	x	x	x		x	x	x	x		x		x		x		x
474	UISB	Siwash Bay	Unakwik Inlet	AK	3/26	x	x	x		x	x	x	x		x		x		x		x
475	PWDI	Disk Island	PWS	AK											x						
476	GASL	Sleepy Bay	Gulf of Alaska	AK											x						
477	GAWB	Windy Bay	Gulf of Alaska	AK											x						
478	CIHS	Homer Spit	Cook Inlet	AK											x						
479	GASH	Shuyak Harbor	Gulf of Alaska	AK											x						
480	BPBP	Barber's Pt.	Barber's Point	HI	3/26	x	x	x		x	x	x		x		x		x		x	
481	HHKL	Keehi Lagoon	Honolulu Harbor	HI	3/27	x	x	x		x	x	x		x		x		x		x	
482	KAUI	Nawiliwili Hbr.	Kauai	HI	3/25			x													